THE IRON AGE — August 24, 1933

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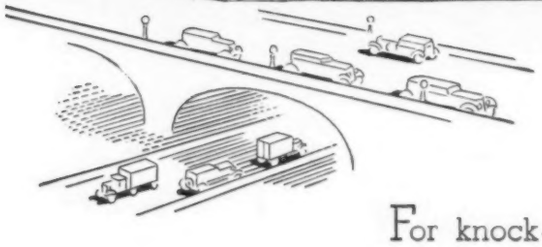
SEVENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

SPEAKING OF TOUGH SERVICE..



For knock-down and drag-out service...day after day...consider the Cletrac Galion Motor Patrol, a product of the Cleveland Tractor Company. This job knows no roads, much less good ones. Over the roughest kind of ground...into ditches and out again...turning, twisting ...pulling, pushing.. None but the best of steels will stand up in its service. And none but Agathon Alloy Steels are used in the upper transmission shaft, main drive shaft, planetary pinions, main drive pinions, rear wheel shaft and other vital parts of the Cletrac Galion Motor Patrol.

CENTRAL ALLOY DIVISION, MASSILLON, OHIO

REPUBLIC STEEL
CORPORATION
GENERAL OFFICES YOUNGSTOWN, OHIO

ACATHON STEELS

THE IRON AGE

ST 24, 1933

Vol. 132, No. 8

Ambrosia— Or *Devil's Brew*

THE mixing of ambrosia, that fabulous food of the gods which confers immortality, is a tricky business. A wrong ingredient may turn it into devil's brew.

Witness what is now emerging from Nira's melting pot.

For a period of years and up to within a few weeks ago, the relations between capital and labor had been steadily improving. Arbitration was fast becoming accepted as the means of settling differences. Strikes, lockouts and "labor troubles" were progressively decreasing.

Even the privations of depression did not detract from the growing spirit of mutual good will.

Today, labor disturbances are in evidence in nearly all industrial sections. Capital and labor are further apart today than they have been in many years in spite of the almost universal granting of shorter hours and higher wages.

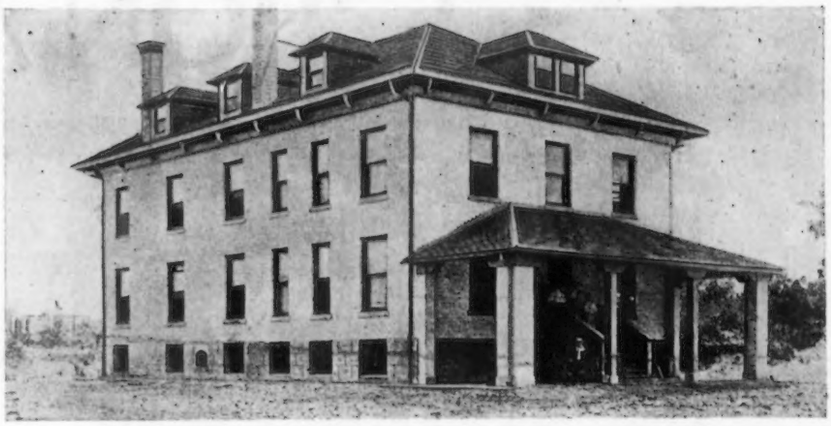
Wrong ingredients have evidently been poured into Nira's ambrosia by unskilled hands.

Professional labor organizers have introduced a harmful ingredient in the form of insistence upon union domination of industry.

Social experimenters and theorists have added their poisonous portion by convincing a large number of people that unlimited wealth and wages can be produced like a conjurer's rabbit from industry's hat.

It would indeed be a calamity for all of us if Nira's ambrosia were to be turned into devil's brew through the actions of a few visionary fantasts or self-interested machinators.

By J. W. HAMMOND
General Electric Co.



Home of O. B. Vinal, General Electric construction foreman, and the construction crew of 60 men in 1907-1908—"the most luxurious building in Gary"

..Epic Story of The First Big

ELECTRICITY as the driving power for steel-mill main rolls was practically unknown thirty years ago. Even a quarter of a century back there were only three motors of any size so used, and these were all direct-current machines. In general, steel mill men looked upon them as experiments and were by no means convinced that electric motors could successfully drive large blooming, rail, billet, or other mills, to say nothing of doing it economically. Under these circumstances, to build a huge new steel mill, larger than any in existence, and in that mill to place absolute dependence for driving power on electric motors greatly exceeding in capacity any motors previously built, required a great deal of courage, faith, and engineering judgment. Any company taking such an advanced step, it was evident, would undoubtedly earn the status of a pioneer.

Such an honor was achieved by the Indiana Steel Co. (later a part of the Illinois Steel Co.), a subsidiary of the United States Steel Corpn. It was organized for the express purpose of building and operating a new and extremely modern steel plant on the southern shore of Lake Michigan. The site was chosen for economic reasons, as the waterfront of two miles afforded the best facilities for the delivery of ore. The ground area covered a thousand acres of sandy wilderness, wholly uninhabited at the time, swept by chilling winds and infested by ferocious sand fleas. It was a desolate spot when, in the early spring of 1906, construction work was started on what was to be the largest rail mill in the world.

From the outset the electric drive was planned for all roll trains and for the billet mill which was also to be a part of the plant. This at once raised the question of motors of exceptional capacities and of dimensions correspondingly large. Engineers of the General Electric Co. expressed their confidence that motors could be designed to handle this type of drive, and accordingly two commercial orders were placed with that company. The first order specified three induction motors of 6000 hp. and three others of 2000 hp.; the second order, placed a few months later, covered three more motors of 6000 hp. and two more of 2000 hp. These two orders together embraced the total electric drive equipment for the main roll drive.

To the General Electric designing engineers it was immediately apparent that they were confronted with new problems of design. No motors of such large capacities had ever previously been demanded. It was to be the largest steel mill electrification on record up to that time. The whole enterprise was fairly athrob with pioneering aspects—a perfect embodiment of the spirit of progress, which these engineers knew to be inseparable from electrical methods in industry. The comprehension of all this aroused the technical enthusiasm of young Howard Maxwell, the designing engineer to whose lot it fell to handle the bulk of the engineering involved in this proposition.

Early in their mathematical calculations and their experiments with small motors and models Maxwell and his associates concluded that it was practicable to introduce the idea of a fractional, instead of an integral, number of slots per pole per phase, for the windings of these motors, thus simplifying the shop process of building motors of a similar type but for differing speeds. The six large-capacity motors were to run at relatively low speeds, 75, 83 and 88 r.p.m., while the speeds of all but one of the five small-capacity machines were to be 214 r.p.m. The fifth of the smaller group was also a slow-speed unit, 68 r.p.m. The varying speeds, momentary peak capacities, and control provisions, especially the problem of quick stopping, were factors requiring unusual engineering study in the design of these motors.

When running free, that is, when disconnected from the rolls, it was found that the 2000-hp. motors would require 2 hr. to come to rest, and the 6000-hp. motors would require 1½ hr. The engineers developed a method whereby direct current at 250 volts was introduced, through an external resistance, into one phase of the windings, after the motors had been disconnected from their own 6600-volt supply line. This reduced the period required to bring the motors to rest to 2 min. and 55 sec. and 1 min. and 42 sec., respectively.

Mechanical Fuse for Spindle Breaks

Still another problem had to do with the necessity for some method of protection in case the spindle which connects the motor with the mill should break during operation. In such an emergency an end thrust is created which would damage either the mill or the motor, but usually the latter. To guard against this, the General Electric engineers devised what they termed a "mechanical fuse" in the form of a steel yoke with a babbitted face, which bears against the end of the shaft, opposite the coupling, and which would break under excessive strain, allowing the revolving element of the motor to slide sidewise, clearing the broken spindle and relieving the thrust pressure. Two heavy bolts hold the yoke securely in place under all normal strains, but these bolts have a reduced cross-section at one point, so that they would give way under any abnormal pressure. This prevents damage to either motor or mill by a method similar to that of the electrical fuse, which melts under an abnormal flow of current and breaks the circuit.

With these supplemental features, together with the capacity to deliver as high as 20,000 hp. on momentary

THIS account of the beginnings of the great Gary steel plant is a belated tribute to pioneering in the field of steel mill electrification. Now, after a quarter of a century of successful performance, are set down some of the details of an epoch-making bit of engineering. In retrospect, few fully realize the measures that had to be taken or the courage that was represented in placing absolute dependence on electric motors of a size that had never been built for driving rolling mills. The consummation of the project was virtually a conquering of the wilderness, so far as the site was concerned, and was achieved through excellent shop work in the motor factories and through the high caliber of the erecting personnel, who struggled against heavy odds. The trail blazing in design and application proved to be the inauguration of a new era in steel mill motors.

irst Big Steel Mill Motors ▲▲

peak loads—in itself an important element, and one which was a determining factor in winning friends in the doubting wing of the steel industry—these motors represented a distinct departure from any previous types. Their physical size was naturally impressive. The largest of them has a height of 28 ft., a length of 26 ft., and a width of 32 ft. They weigh close to 400 tons. The heaviest single part is the rotor (with shaft and coupling) of the 6000-hp. machines,—272,000 lb.

Late in 1907 the component parts of these motors were on the site of the steel plant, ready for erection. Because of their size they were shipped "knocked down," the assembling and testing to be done by the erecting crew. The foreman of the construction force, O. B. Vinal, arrived at the site in November to find a small three-story hotel in process of building for housing his men during the job. Until this building was completed the assembly crew found the bunking decidedly rough.

Vicissitudes of Wilderness Construction

The folk who planted American civilization in the wilderness seldom lived amid more primitive surroundings than the men who built Gary, Ind.—the name given to the town in honor of the late Judge Elbert H. Gary, long chairman of the board of the United States Steel Corpn. This was also a wilderness—a wilderness of sand, blown upon almost continually by chilling gales which piled the loose soil in countless shifting dunes. The sand, once churned by traffic, became instantly a fine white powder, resembling snow. It was so loose that men sank ankle deep, and to walk a quarter of a mile was an exhausting exertion. In the face of a whipping wind, which blew this powdery substance into the eyes in pailfulls, necessitating the constant wearing of goggles, pedestrianism was accompanied by unceasing profanity. As the proverbial "last straw," there were the sand fleas, whose number was legion, whose biting power was terrific, and whose presence was always to be reckoned with, indoors and out.

Gary, Ind., in 1907

The population of Gary, during those first few years of "staking out" and "roofing over," was nine-tenths masculine. The men were mostly young huskies — contractors' workmen, builders' gangs, machinery erectors, sheet metal workers, iron workers, masons, carpenters, teamsters, laborers—and Vinal's construction crew engaged in setting up the big motors. This predominantly male community, suggestive of California's gold-rush days or the western Pennsylvania oil-boom period, went about incased in thick sweaters or well-worn lumber jackets. For the most part everyone was goggled—and everyone shivered through the winters and sweated through the summers.

The town itself, in the fall of 1907, consisted of a single narrow street engulfed in the white sand from one building line to the other. The buildings were merely rough shacks—a few barns converted into boarding houses; an odd assortment of plain, square wooden structures serving as stores; a lunch room or two of the dining-car type. The most luxurious affair in the community was the General Electric hotel; the largest structures, of course, were the mill buildings, which, as time went on, advanced steadily toward completion.

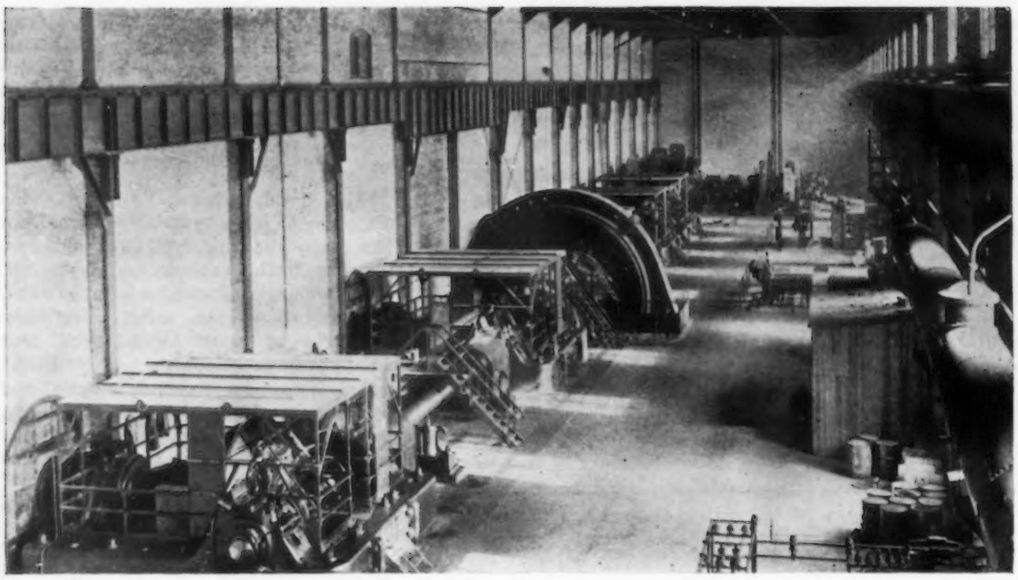
Vinal, an Undecorated Hero

The hotel, where Vinal and his sixty men were quartered, was not far from the mill, yet to walk, during the first year, from one to the other was as arduous as a day's work, on account of the sand. To make the trip at noon in addition was wholly impracticable. Accordingly Vinal hired an express wagon and had hot lunches delivered every day, thus making possible a half-hour noon rest and at the same time conserving his men's energies. During the first winter, however, the work was carried on amid much discomfort from the cold, as the mill buildings were not yet inclosed and the sole method of obtaining heat was from a number of salamander stoves scattered around at different points. These only heated a small area in their immediate neighborhood.

Vinal soon discovered an additional complication. He had to run the hotel as well as direct the erection of the motors. His huskies were young enough to be boyish and most of the time Vinal "daddied" them to the extent of keeping up the larder, maintaining a kitchen crew, and collecting the room bills, charging himself a higher rate so that the men's rate need not be increased in order to meet expenses. His kittenish "patrons" had a habit of raiding the pantry late at night and leaving very little for breakfast. They played other pranks, too, such as bringing in a small flock of geese in the small hours and releasing them on every floor of the building, the frightened squawking awakening everyone. Toward the end of the two years Vinal was growing thin on his dual job of construction foreman and hotel proprietor.

Field Machining and Assembly

Problems directly arising from the work itself were incessant. Again and again they challenged the resourcefulness of the erecting squad. The motors had never been assembled in the shop, so that a certain amount of machining was required when they were set up at Gary. Furthermore, the core assembly work, involving insertion in the proper slots of thousands of thin laminations, was especially difficult since it had to be done after the rotor and stator frames were in place and hence in a vertical position. When such cores are assembled in the shop the frames are placed horizontally and the laminations can be simply laid in place. There were about 100,000 laminations for the armature and field of each of the larger motors, and seventeen men, all working in close cooperation,



SOUTH motor room of the billet mill of the Illinois Steel Co., Gary, Ind., in March, 1910.

were required to wedge them in place. Although this did not involve any sort of dilemma, it was unduly arduous.

More vital to the satisfactory operation of the motors was the necessity of turning the faces of the rotors to make the air gap conform to the specifications of the contract. The air gap was to be 0.2 in., and the limit of allowable variation was only 8 per cent. This problem involved the erection of gear, rigging and turning tool alongside the motors after the rotor frames were in position and then turning of the rotor faces to the required dimension. The built-in flywheel, also, required final machining of the large, circular steel plates, which were bolted together to produce the desired effect.

Large banks of rheostat resistances connected across the rotors controlled the flow of current to the motors. The wiring connections which these rheostats involved presented a problem in themselves. The solution was devised by one of Vinal's men who used conduit, then a comparatively new material. He made an exceedingly neat job, which long stood as a pattern for all succeeding motor installations in steel mills.

The pioneer character of this installation, which was without benefit of precedents, constantly involved new methods, and even changes from the original designs. It had been intended that all motor bearings should be chain oiled, but the assembly work was not far advanced before it was found desirable to change to ring oiling. The change precipitated a great deal of machine work on each pedestal to obtain sufficient clearance for the oil rings. The work was done upon bearings of unusual size and with machine shop facilities unusually limited.

Whenever he had occasion to mention in later years these Gary steel-mill motors and the work of installing them, Vinal always ascribed the success of the job to two factors—the excellent shop work in the factory and the high-class personnel of his erecting crew. He found when he started on this assignment that the motors had been designed with the utmost intelligence and that the shop workmanship was of the highest order. As for his own force, the slack times which then prevailed permitted him to recruit superior men for all departments of the work. Although but few of his crew had ever previously had experience in assembling and erecting electric motors, nevertheless he had skilled workers for every task and was never obliged to feel concerned regarding the type of man whom he placed in positions of responsibility.

Start of Operations Quietly Dramatic

By the end of 1908, just 25 years ago, the erecting job was nearing completion. The motors for the rail mill were erected first, so that all the major problems were worked out and settled entirely on that part of the job. The billet mill motors, being merely duplicates of the others, were set up in half the time. The executives and engineers of the General Electric Co. became apprehensive toward the end that the installation would not be completed within the period specified, and continually around the beginning of 1909 Vinal was getting disturbed messages to this effect. But these did not bother him, for he knew exactly where he stood. In finally turning over the motors for operation he was on time with a margin of some days to spare.

The final operating test came on Feb. 17, 1909, the date on which the first rail was rolled. All machinery was then in place for operating the mill, including, of course, the electrical equipment. In the rail mill, the largest in the world, stood the six gigantic electric induction motors, three of 6000 hp. and three of 2000 hp. In the billet mill were five more electric motors equally as large as those in the rail mill, three of 6000 hp. and two of 2000 hp. These motors drove the blooming mill stands, which were of various capacities. The electric power plant, nearby, was completed, with 17 electric generators of 2500 kw. capacity each, 15 of them of alternating-current design and the other two built for direct-current work. These units were driven by gas engines, representing an achievement in plant economy as the engines were powered by the gases of the blast furnaces, which otherwise would have been dissipated in the open air.

On the day of the operating tests, high engineers of the General Electric Co., as well as visiting engineers of other electrical concerns, and a considerable number of steel men, gathered at Gary to see the motors put in permanent service. It was a new experience all around. These were the largest electric motors in existence up to that time, and it was by far the largest steel mill electrification. No one knew just how well the motors would perform. Vinal himself did not know, for, although he had given them a successful preliminary test a few weeks previously, he had had no opportunity to test them under load.

It was evident that many of the steel mill men present were quietly skeptical concerning the success of this distinct innovation in driving power for mill machinery. They, and some of the visiting electrical men as well, apparently supposed that when the motors were started the voltage would be applied gradually, perhaps in steps of 2000 volts, until the maximum rated voltage was reached. Instead, however, Vinal put on the full line voltage at the outset, knowing that the banks of rheostats would regulate the flow of current and that no

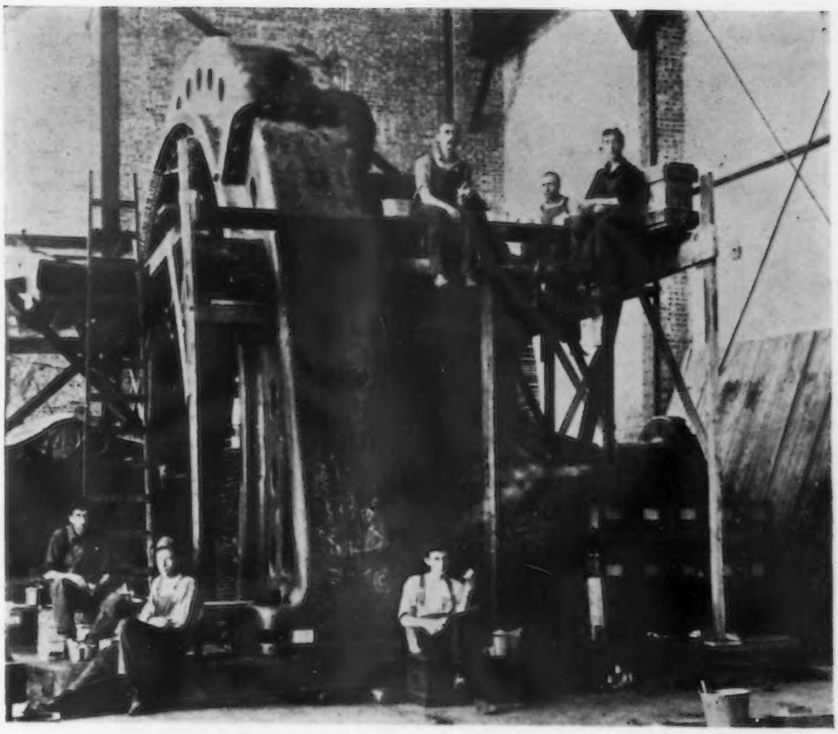
harm could occur to the motors. After the motors were running, Vinal and most of his crew went into the other part of the building to watch the billet mill roll the steel, leaving the motors to take care of themselves. He was as confident regarding the quality of workmanship in those humming units as he was concerning the work of his own erectors in setting them up. His confidence was justified, for the motors gave a perfect performance, even when left alone.

Still Working After a Quarter Century

They are still in operation at the Gary plant, after a quarter of a century. They were pioneers in every sense of the word, setting up new standards and practices in steel mill operation and inaugurating a great era of steel mill electrification in subsequent years. In the year or two immediately following, the General Electric Co. booked orders for steel mill motors of more than double the total capacity of the Gary motors; and the progress of such electrification was extremely rapid throughout the following decade and later. Skepticism in the steel world as to the capabilities of the electric drive was pretty completely eliminated on that February day at Gary.

In electrical circles this was termed "the greatest mill electrification." Years afterward writers who represented electrical and industrial interests other than General Electric said of it: "The boldness of the engineers .... has been more than justified ... The design and building of the slow-speed induction motors, for which there was no precedent, were a great and successful undertaking . . . All American engineers interested in steel mills are indebted to the pioneer work done at the Gary plant."*

Since 1907-08 electric motors for steel mill work of even larger capacities than those first installed at Gary have been built and put in successful operation. But there are none anywhere of greater historical renown or deeper contemporary influence.



One of the 6000-kw. induction motors in process of installation at Gary in the winter of 1907-08.

* "A Review of Steel Mill Electrification," by B. G. Lamme and W. Sykes. Association of Iron and Steel Electrical Engineers, 1922.

Ascendency of Alloy Steel Castings

ALLOY steels continue to be relatively more important in the castings field than in rolled steel and forgings. Production of alloy steel in 1932 is given by the American Iron and Steel Institute as 757,560 tons of ingots and 41,044 tons of castings. Of all ingots (13,464,402 tons), output of alloy steel ingots represented 5.62 per cent; and of all castings (216,760 tons), those of alloy steel account for 18.9 per cent. The ratios are decidedly on the increase in the case of castings but more or less stationary in the case of ingots.

For example, ten or more years ago about 4 per cent of all the ingots were of alloy steel; the ratio was 6 per cent in 1928, approached 7 per cent in 1929, but was 5.85 in 1930, 5.38 per cent in 1931 and, as stated, 5.62 in 1932. As for alloy steel castings, against the 18.9 per cent classified as such in 1932, the proportion was 17.4 per cent in 1931, and for the preceding four years it averaged 12.5 per cent, while ten or twelve years ago the percentage was of the order of 5.

The electric furnace has bettered its position in the alloy field. Some 58.8 per cent of all the alloy castings in 1932 were of electric steel, and 15.4 per cent of all the alloy steel ingots came from the electric furnace. Of alloy ingots and castings combined, the electric furnace supplied 17.5 per cent in 1932, 16 per cent in 1931, 12.3 per cent in 1930 and 12.9 in 1929.

Position of the Rustless Steels

A survey of the rustless steel industry's production for the last four years was published in THE IRON AGE, Feb. 16, 1933. If the results of this analysis are compared with the alloy steel production of the same four years the following percentages are obtained:

Percentage of Rustless Steels

	Total Alloy Steel, Gross Tons	Rustless Steel, Gross Tons	Per Cent
1929.....	3,957,200	47,580	1.20
1930.....	2,443,300	53,080	2.17
1931.....	1,455,900	30,280	2.08
1932.....	798,600	23,770*	2.97

*Estimated.

	Electric Alloy Steel, Gross Tons	Rustless Steel, Gross Tons	Per Cent
1929.....	510,000	47,580	9.33
1930.....	300,500	53,080	17.60
1931.....	232,100	30,280	13.00
1932.....	140,870	23,770*	16.80

*Estimated.

Dry-Quenched Coke for the Blast F

By J. FRANKLIN MILLER
Chief Engineer, Midland Tube & Pipe Co.
Bound Brook, N. J.

IN the ordinary present-day operation of the by-product coke plant, the hot coke is discharged from the oven into a transfer car and is then taken to the wet-quenching tower, where it is flooded with about 500 to 600 gal. of cold water per ton of coke cooled. Vast clouds of destructive dust-laden vapors are broadcast to the atmosphere and the dust is gradually precipitated over the plant and adjacent territory.

In the dry quenching, as by the Sulzer system, the hot coke is cooled by the continuous passage through the coke of automatically formed inert gases. The heat collected is transferred by circulating the gases through a boiler for developing steam for plant use. This operation must naturally be in a closed cycle, and with not more than a single outlet open to the atmosphere at a time, thus to gather no excess of oxygen.

The unit in the Sulzer system includes a brick-lined coke container, not unlike a squat blast furnace. Into this, the hot coke from the coke car is regularly charged, usually by means of a skip hoist. While the inlet door at the top of the container is open to take the charge, a small amount of oxygen enters and quickly consumes any accumulated hydrogen. The remaining inert gases are circulated by constant speed fans, and are evenly distributed through the mass of hot coke, then passed directly through a superheater, located in a dust chamber, and thence through an inclined fire-tube boiler. The gas is then drawn through a second dust collector at the lower end of the boiler tubes where the remainder of entrained dust is dropped. The cooled gas is drawn through the suction side of the circulating fan for another cycle.

When the system is first started a small portion of the air is converted into a mixture of carbon monoxide and carbon dioxide, the percentage of each depending on the temperature at that particular time. However, the oxygen of the encased air is quickly consumed and a mixture of inert non-combustible gases remains. A typical analysis of this gas after charging coke is: CO_2, 10.9 per cent; O, 0.37 per cent; CO, 6.6 per cent; H, under 10 per cent; N, balance. The possible loss of coke through burning has been determined to average 0.04 per cent, an entirely negligible quantity.

Since the coke is charged to the container at regular intervals and immediately after pushing, the entrance temperature of the coke closely approximates 1800 deg. F. Preceding each charge, the outlet door is opened and a charge of cooled coke is dumped from the container, through coke rakes, and at a sufficiently low temperature to be handled on rubber-covered belt conveyors.

The pressure drop of gases through the entire unit is equal to about 7 in. water gage. The power consumption for the skip hoist is about 0.25 Kwhr. and fans about 2.5 Kwhr. per ton of coke cooled. A plant capable of cooling 1000 tons of coke per day will occupy a space of about 60 x 60 ft., and a plant for 4000 tons per day probably occupy a space 70 x 105 ft.

Benefits Realized by Dry Quenching

Of foremost interest to the blast furnace operator is the fact that dry quenched coke is clean coke, and though it has been said, "if good coke is not made in the ovens, it cannot be made in the wet quenching or screening station;" yet dry quenching does clean up the incompletely distilled pieces now so common, and delivers a cooled coke free from "nigger heads" or black pieces.

The rough surface of coke makes it particularly attractive to breeze and dust when wet and for this reason makes breeze separation in screening more difficult, and complete removal impossible. A certain amount of breeze adheres to each individual piece of coke, and falls off only when the mass is dried out, and that usually happens only in the furnace.

This fine coke serves no useful purpose and is carried out by the blast furnace gas, and from which it must be removed by spraying or scrubbing. The quantity of this useless fine coke is approximately 25 per cent of the dust in blast furnace gas.

The recoverable heat from 1800 deg. F. coke is about 1,000,000 B.t.u. per net ton. In the dry quenching system about 95 per cent efficiency is attained, and in practice, from reports covering long periods, there is shown to be an output of over 1000 lb. of steam per net ton of coke cooled. This steam credit is perhaps the greatest economy in this system, and alone justifies the plant installation.

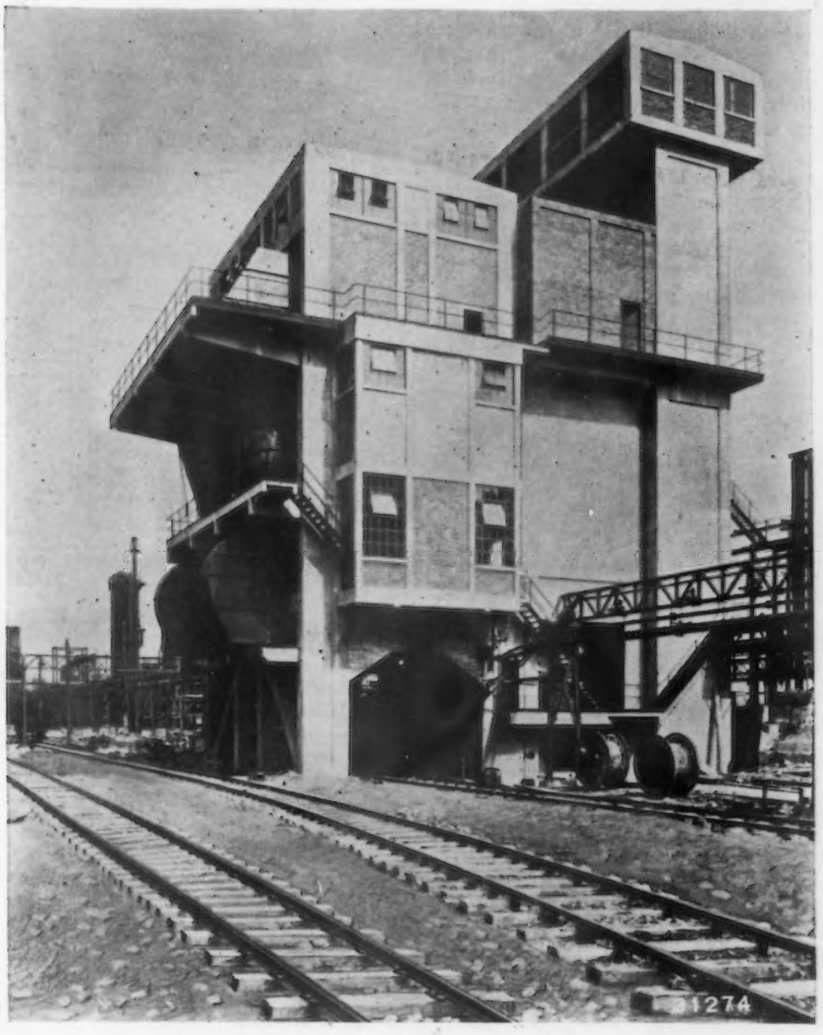
The maintenance and repair costs on the wet quenching system are large in comparison to the original cost of such equipment, and with its elimination a figure better than $0.02 per ton of coke can be reasonably charged off. The wet quenching stack and its equipment have a short life (about 10 years) due to destructive vapors; and the coke car itself, an even shorter life, primarily due to the excessive expansion and contraction strains set up within it. In addition, the cost of pumping water (500 to 600 gal. per ton of coke quenched) as well as the large amount of make-up water necessary, figure largely in these economies. The removal of fine water-soaked breeze from settling basins, sumps and piping is another maintenance feature which is eliminated by the dry-quenching process.

In plants supplying a market for domestic coke a worthwhile saving will be observed due to the lesser amount of crushing required, and thus also is less breeze produced. Due to the lack of moisure in domestic sizes, it is about 8 to 10 per cent more efficient in heating. Dry and wet quenching plants selling to domestic trade in the same locality have agreed on a 7 per cent figure, and this has forced the wet quenching plant to supply 2140 lb. of coke to the householder at the same cost of the dry quenched coke plant's net ton of 2000 lb.

Owing to the more efficient combustion, uniformity in size, and inherent strength of dry quenched coke in the blast furnace, there is a decrease in the coke rate of 4 per cent or better. This decrease will liberate a large amount of coke for making more pig iron or for sale in the domestic market. If the furnace can take it, this increase in pig iron may amount to 25 tons per day per furnace. Or, in the case that the sur-

lastFurnace ▲ ▲ ▲

DRY quenching offers large economies to the blast furnace plant, according to the author, who reviews what has been done in the field to date. His study of costs and savings should be helpful. Dry quenching, in a word, is a cooling of the coke as it comes from the ovens by forcing inert gases through it; a blower keeps the gases moving in a continuous closed cycle in which the heat extracted is delivered to a tubular steam-raising boiler and the cooled gases are returned to abstract heat from incoming fresh supplies of coke.



Dry quenching plant at the Ford Motor works at Dagenham, England.

plus coke could be absorbed by the domestic market, it would turn in a revenue of about $150 a day per blast furnace.

In plants where coke ovens are fired by producer gas there is an additional saving from the use of dry quenched coke (through ⅞-in. screen) of about 25 lb. of fuel per ton of coke produced. This usually amounts to a saving of better than 8 per cent. One plant using small coke (through ¾-in. screen) uses 254 lb. coke per ton of coal carbonized. This plant also returns fine breeze (through ⅛-in. screen) to the coke plant and uses a 2 per cent mixture with the coal for coking. Provided this breeze is well mixed with the coal, the structure of the coke is not adversely affected.

In the sintering of iron ore one plant is using a mixture containing 3 per cent fine breeze, with no coal added for fuel in the sintering pans.

In England, one dry quenching plant sells fine breeze to manufacturers of building blocks. There are several excellent methods in use whereby the breeze is kept out of the boiler plant, and thereby earns a larger credit.

Records of Operation

That dry quenched coke used in blast furnaces insures better operation and a noticeable reduction in coke burden is indicated by operating records of European installations, as at the Homecourt works, and at the Witkowitzer plant in Czechoslovakia.

Reports from Homecourt (Compagnie des Forges et Acieres de la Marine et d'Homecourt) show a saving of 4.17 per cent in the blast furnace coke rate, owing to the use of dry quenched coke instead of wet quenched. (Dr. Mueller, "Comparative Investigation of Dry and Wet Quenched Coke.") This company also reported "that by the use of dry cooled coke more regular and improved action of the furnace was evident, and trouble caused by hanging of the load in the furnace was greatly reduced. Dry quenched coke does not break up under the heavy load of the charge, as is the case with wet quenched coke. The formation of dust and breeze pockets in the blast furnace is thus prevented, and a more regular distribution of the blast through the charge is secured."

This plant with a capacity of cooling but 1000 tons of coke per day decreased the coke burden 14,595 tons a year.

Reports from the Witkowitzer Bergau und Eisenhütten Gewerkschaft show definitely a saving of 3 per cent in coke consumption at the blast furnace, and this against a previous practice of using mixed coke.

Quoting a letter from this company, we find that "dry quenched coke does not change its size to any great extent in the blast furnace because of mechanical handling. This complete freedom of the charge in the furnace from newly formed breeze and small coke has an essential influence upon the regularity of the furnace operation and the pig iron and therefore upon the saving of coke.

"A further advantage of the dry quenched coke is the absence of water content — otherwise varying — which always permits charging the furnace exactly the amount of carbon required, which renders regularity to the furnace operation and lowers the consumption of coke."

On this point, Schadrin in "Sa Industrialisazizu," Moscow, April 4, 1931, says: "I had an opportunity to inspect a Sulzer dry coke cooling plant at the Witkowitz steel works. With one ton of dry-cooled coke 400 kg. (882 lb.) of steam are produced at a pressure up to 14 atmospheres (200 lb.). One of the blast furnaces

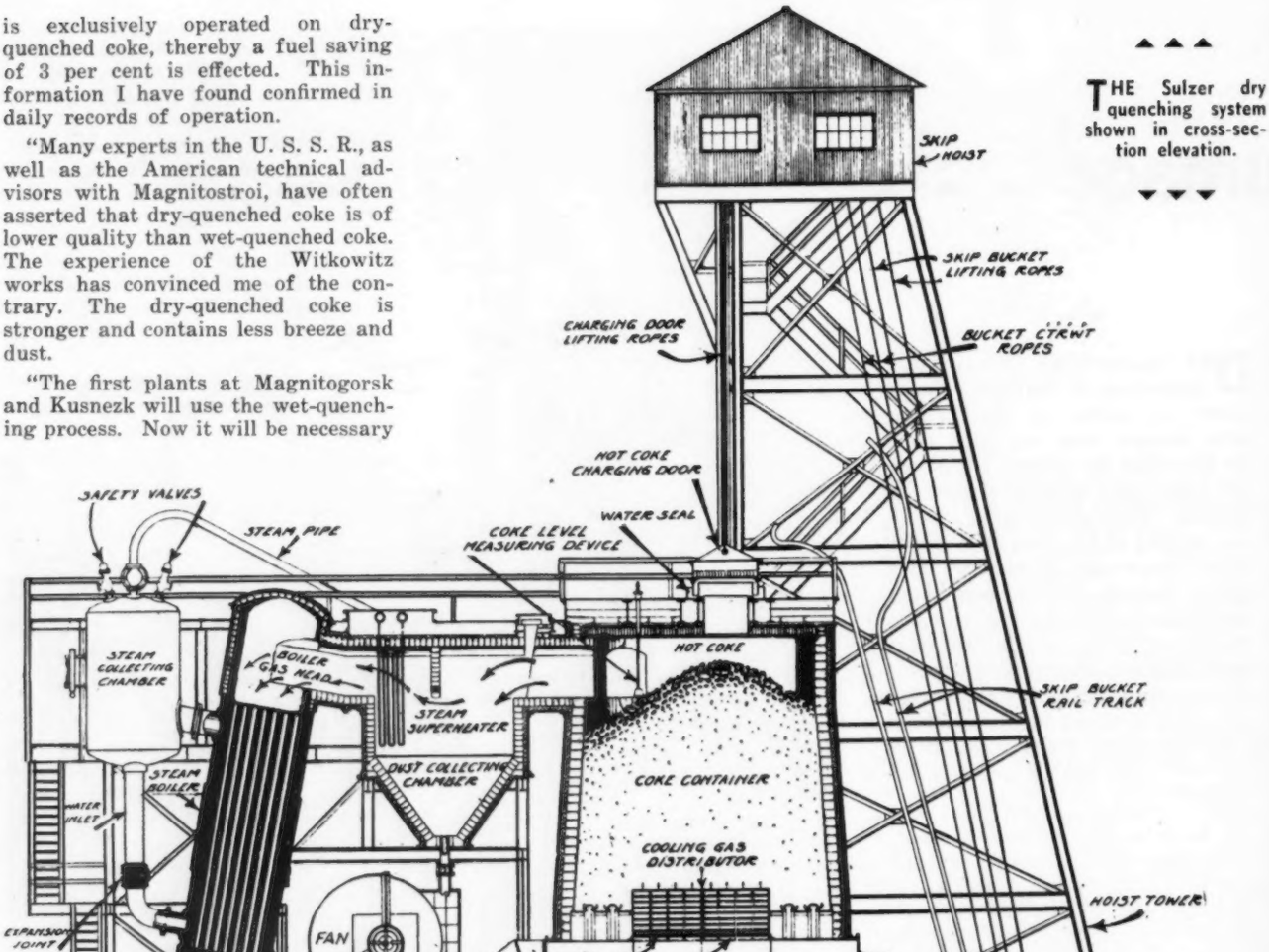
is exclusively operated on dry-quenched coke, thereby a fuel saving of 3 per cent is effected. This information I have found confirmed in daily records of operation.

"Many experts in the U. S. S. R., as well as the American technical advisors with Magnitostroi, have often asserted that dry-quenched coke is of lower quality than wet-quenched coke. The experience of the Witkowitz works has convinced me of the contrary. The dry-quenched coke is stronger and contains less breeze and dust.

"The first plants at Magnitogorsk and Kusnezk will use the wet-quenching process. Now it will be necessary to make provisions for a change to dry quenching for the extension plants and to build the coke ovens with a view of adopting the dry-quenching process. Considering the tremendous scale of these plants the economies effected are bound to be tremendous, too."

In addition, may be listed the recently completed dry-quencher installed at Dagenham, England, for the Ford Motor Co. This plant will cool coke for a 500-ton furnace making a single grade of foundry iron. Interesting records should be forthcoming as this furnace gets into production. The data of the Dagenham dry quencher are: Plant capacity, 700 gross tons coke per day; steam pressure, 200 lb. gage; steam temperature, 600 deg. F.; weight of coke per charge, 9 gross tons.

The 500-ton furnace now being completed at Pretoria, in the Transvaal, for the South African Iron & Steel Industrial Corpn., will use dry-quenched coke exclusively. This furnace will supply basic, foundry and special irons. The furnaces at Dagenham and Pretoria are the first blast furnace plants which have incor-



THE Sulzer dry quenching system shown in cross-section elevation.

porated dry quenching equipment in the initial plant construction.

Steam Production Data

From various reports, covering considerable periods, of the Rochester Gas & Electric Corpn., Rochester, N. Y., the following data have been taken:

Steam produced per net ton of coke cooled (Blowdowns and Bleeders deducted), lb.	942.4
This is steam produced from and at 212 deg. F., lb.	1055.22
Steam pressure, average, lb. gage	141.
Superheat	none
Feedwater, average temperature, deg. F.	140.
Average power consumed per net ton of coke cooled, kwhr.	2.37

Rochester was the pioneer in the dry quenching field in this country. The plant has been in operation more than six years and has proven to be a most profitable and economic venture.

A. M. Beebee, general superintendent of the gas department at Rochester, in a letter to the author, states: "The operation of dry quenching enables us to provide a better quality of coke, since it produces a coke which is stronger and more resistant to further handling and due to the lack of moisture enables better screening and sizing of the coke to take place. The value of the steam alone produced has made the dry quencher, in our case at least, a decidedly economic venture.

"The use of dry quenched coke results in a production of breeze with a minimum of moisture. This is a very decided advantage for the reason that it enables all the breeze that is produced to be used in the operation of the coke plant and none necessary to be used as boiler fuel. In our plant this is quite an achievement for the reason that we use straight high volatile coal which produces a somewhat weaker coke and therefore always has been productive of larger quantities of breeze than is usually produced at most coke plants. The use of dry quenching enables a larger percentage of the breeze to be used in the producers and also along with the coal prior to carbonization."

The second plant installed was at Flint, Mich., in 1929, for the Consumers Power Co. From a report for 1932, we find the following:

Steam produced per net ton coke cooled (Blowdowns deducted), lb.	971.9
This is steam produced from and at 212 deg. F., lb.	1098.
Steam pressure, average, lb. gage	227.
Superheat, deg. F.	136.
Feedwater temperature, average, deg. F.	220.

Set-Up For Blast Furnace Plant

Assuming an installation in connection with a blast furnace and by-product plant, a plant containing, say, three 700-ton furnaces or four 500-ton furnaces and the coke plant producing 2250 net tons of coke per day, the following set-up can be taken as typical.

Coke cooled, per year, net tons	810,000
Average temperature of hot coke, deg. F.	1,800
Steam pressure, lb. gage	150
Superheat, deg. F.	100
Feedwater temperature, deg. F.	200
Cost of electric energy per kwhr., hundred	1
Steam value per 1,000 lb. produced, hundred	35
Steam produced per hour, lb.	85,200
OPERATION	
Labor, increase in rate of present wharf operator to that of water tender	$ 1,750
Power required to operate dry quencher installation	24,300
Maintenance of dry quenching plant equipment	24,300
Boiler feedwater	2,800
Total operating expense, per year	$ 53,150
Total operating expense, per 1,000 lb. steam	$0.0722
Direct Savings — Elimination of expense of pumping wet quenching water, and reduction in maintenance of hot coke handling equipment	$ 24,300
Net operating cost, per year	$ 28,850
Net operating cost per 1,000 lb. steam	$0.0392
Investment, estimated cost of dry quenching plant, installed and complete	$450,000
Fixed charges, interest on investment, depreciation, taxes, insurance, etc., 13.5 per cent	$ 60,750
Depreciation on stand-by boiler plant (already existing)	7,750
Total fixed charges, etc.	$ 68,500
Total cost of plant, per year	$ 97,350
Revenue from value of steam 700,000 M. lb. @ 35c.	$245,000
From reduction in coke rate 3 per cent saving on 2,000 tons a day, or 60 tons for 350 days, @ $3 a ton	63,000
From domestic sales, say 50 tons a day for 300 days, @ $4 a ton	60,000
Total revenue per year	$368,000
(Credits for savings of 8 per cent at gas producers not listed, nor credits for fine breeze).	
Less operating expense and fixed charges	$ 97,350
Total net profit, per year	$270,650
Per cent total net profit, per year	60.2

From the foregoing set-up. it is to be noted that a plant of this size would pay for itself in well under two years. With a plant of smaller capacity, it will, of course, take a longer time, probably about two and one-half years. Thus in either event, one might conclude that a dry quenching plant would prove an entirely profitable venture.

As a summary of the previously noted facts, it is worth while to quote from a report of a recent meeting of the Blast Furnace and Coke Association, Chicago district, the following statement:

"The advantages of the dry quenching method as indicated by the performance at Rochester are as follows:

A. Recovery of 1000 lb. of steam per ton of coke cooled.
B. Elimination of clouds of steam with resulting condensation and deterioration of equipment.
C. Elimination of the nuisance of clouds of steam along walks and wharves.
D. Lower maintenance cost on auxiliary equipment as hot car, screens, belts.
E. Lower labor cost of handling coke.
G. More uniformity of size in coke (except where sizing is practiced).
H. More uniform moisture.
I. Elimination of water pumping cost.
J. Saving in freight where coke is shipped.
K. More thorough screening.

Several steel companies have at this time plans under advisement for dry quenching installations. The dry quenching of coke will be popularized, in both steel plants and public utilities, by the incessant and altogether imperative demands for lower costs and elimination of wasteful practice.

Heat-Resisting Cast Irons in Four Groups

CAST irons of good heat-resisting properties are grouped into four classes by E. Morgan, of the British Cast Iron Research Association. He contributed a paper on the subject to the recent conference at Cardiff, Wales, of the Institute of British Foundrymen. The classes are: Types of white and unmachinable cast irons used because they do not grow under the influence of high temperatures; close-grained cast irons containing low silicon and carbon and negligible quantities of phosphorus, corresponding with good engineering properties and sometimes having alloy additions; high silicon irons, silicon in excess of 4 per cent of the Silal type; and the recently developed austenitic cast irons.

After white unmachinable irons, which do not grow, austenitic irons, especially the high-silicon type, come next in order of merit, according to Mr. Morgan. As to the other types, he advises that if the conditions of service are severe and above 700 deg. C., irons of the Silal type should be used, provided the right composition is chosen and the rate of heating or cooling be not such as to make the lack of ductility a serious matter. When the temperatures are below 700 deg. and the conditions are not seriously oxidizing, the low-silicon type is preferred.

To resist the corrosion action of high-temperature oxidizing gases containing sulphur compounds, one must be prepared, he urged, to use high contents of chromium, silicon or aluminum in the castings. For reducing conditions, especially in the presence of sulphur, no cast iron or steel, he asserted, will stand up at high temperatures for any length of time.

At the same meeting F. B. Coyle, research metallurgist of the International Nickel Co., reported on American progress in the use of alloys in cast iron. He pointed out that although increased strength could be obtained by adding carbide-forming alloying elements, it was found advisable to supplement their effect by the addition of graphitizing alloying elements, such as nickel, to facilitate machining. He added that it was firmly believed among American foundrymen that the use of alloying elements in iron castings was not only firmly established but that the future would see its use considerably extended.

New Rapid Determination of Titanium in

By Dr. C. MORRIS JOHNSON
Chief Chemist, Park Works Crucible Steel Co. of America

THE method often used for determining titanium in steels comprises boiling the hydrochloric or sulphuric acid solutions of these steels with sodium-thiosulphate but gives low results. The high-chromium content of the solution retains a very considerable amount of the dissolved titanium, even after protracted boiling in faintly acid condition. Further, as is well known, as much as 20 to 25 per cent of the titanium present remains insoluble in the acid after solution of the drillings. It must be filtered out, fused with 5 g. of Na_2CO_3 or $K_2S_2O_7$, preferably the latter salt, and the fusion dissolved in dilute HCl. This titanium is then precipitated with "thio" as not enough Cr is present to interfere, or is added to the main solution.

Also these steels usually contain all the way from 0.05 to 0.20 per cent of aluminum from the ferrotitanium which frequently has 5 per cent aluminum in it. The interference of the high Cr can be prevented by removing it, at the start, from the solution by the mercury cathode method. In this electrolysis all but a few milligrams of the Fe and Cr are absorbed out of the solution by the mercury. However, all of the Al is still in the electrolyte with the Ti and must be removed along with the two or three milligrams of chromium still remaining with the titanium.

The mercury cathode outfit is expensive. It means a large outlay for platinum and mercury. The latter must be redistilled frequently, and a glass still does not last through very many runs. It is not a rapid method but does not require quite as much of the operator's continuous attention as the following gravimetric method which is accurate and removes all interference of Al, Cr, Si, and Fe. Further it requires no expensive apparatus or high-priced chemicals and is considerably more rapid.

Thirteen years ago the writer published his method by which the bulk of the iron is removed from all steels by fractional precipitation of the Al, Ti, Cr, Zr, U and V by the simple expedient of adding a very slight excess of 1 : 1 ammonia water to the solution of the iron in the ferrous state. Then he filters off at once the non-ferrous elements. The resulting precipitates are thus freed from the bulk of the iron (see *Chem. & Met. Eng.* 20, 523, 1919, and Chemical Analysis of Special Steels, fourth Edition and earlier editions). A modification of this original procedure is adapted to the determination of the Ti in these high chromium steels and also the Al, but the latter element can be run to a better advantage in the method given for Al.

The Gravimetric Method

Dissolve 3.5 g. of thin or finely divided drillings by heating them in an 800-ml. beaker with a mixture of 80 ml. 1 : 3 H_2SO_4 and 80 ml. of H_2O. Continue to heat without boiling, maintaining the original level of the acid by additions of boiling water (boiled to remove air and to maintain the near boiling temperature during solution). Raise the liquid to boiling toward the end of the dissolving operation to make sure all particles of steel are decomposed. The foregoing requires, normally, about one hour. As titanium cannot be hydrolized from a sulphurous solution of Cr and Fe in the manner given in the method for Al (Aug. 17, 1933), the method of fractioning is different from the Al procedure.

Dilute the solution of the steel with 100 ml. boiled H_2O. Then add 1 : 1 filtered ammonia water until the Cr hydroxide formed begins to redissolve rather slowly. Then dilute the solution with boiling water to a volume of 350 ml. Next add 1 : 1 ammonia water until the pale blue precipitate of hydroxides of Cr and Ti coagulates and the hot solution smells distinctly of ammonia. Avoid a large excess of NH_4OH. By this time a light brown film, or it may be a greenish film, will form on the surface of the hot liquid and there is still some excess of NH_4OH. Stir in a 1-in. diameter ball of ashless paper pulp and filter out the Cr and Ti and some Fe at once, through 12.5 cm. ashless, rapid and double filter papers; No. 31 is a good grade.

Let the precipitate drain. Rinse all solution out of the beaker on to the filters. Use two funnels to each 800 ml. beaker. Then wash the papers and mixture of pulp and precipitate ten times with cold water.

Dissolve this precipitate off the filters with 80 ml. of boiling 1 : 1 HCl. Wash the acid taste out of the filters with cold H_2O. Peroxidize the solution and washings.

Boil the peroxidized solution ten minutes, filter it, wash the precipitate with 1½ per cent Na_2CO_3 solution exactly as described in peroxidizing for Al in this series of methods, except that the precipitate and pulp from the peroxidation are washed only twice by stirring in a filter full of the Na_2CO_3 water wash. Also on account of the considerable iron that is unavoidably co-precipitated with the Cr, it is best now to scrape carefully most of the precipitate and pulp back into the peroxidation beaker with the small porcelain spoon used in the shooting of Na_2O_2 into the solution when peroxidizing it. (See Al method.)

Then rinse the remainder of the precipitate—all but a stain of iron into this beaker from the two funnels. Avoid too strong a jet and proceed carefully to prevent tearing the papers. This transfer of the pulp and precipitate to its beaker is rapid. Then add 60 ml. 1 : 1 HCl to this pulp and precipitate, pouring the acid around the beaker walls to dissolve any adhering precipitate. Warm the mixture of acid and pulp until the latter is white and the hydroxides are dissolved. This whole operation requires only a few moments. Cool the solution and dilute it to 350 ml. (leaving the pulp in it) with H_2O. This operation is much quicker than dissolving the precipitate on the filter and then washing the same free of acid.

Next, repeat the peroxidation, boiling 10 min., filtering the precipitate of Ti and some Fe on the same filters, again, and so on, until the filtrates no longer show more than a slight tinge of yellow. This may require four peroxidations but, as the fourth filtrate shows only this trace of color, three peroxidations are usually sufficient unless the iron remaining on the filters with the Ti is excessive. By actual timing, it requires 7¾ hr. to dissolve two tests, make the fractions, and four peroxidations to remove the Cr, using 3.5 g. of an 18-8 steel with Ti. It is the iron co-precipitated with the Cr and Ti that greatly interferes in the peroxidations to separate the Cr as chromate from the Ti and residual iron.

The original set of double filters on the two funnels, per each test, will last until the final peroxidation is

m in Corrosion-Resisting and Plain Steels

NEW analytic methods, particularly for rustless steels, have been developed by Dr. Johnson. Methods for ascertaining carbon were detailed in THE IRON AGE of Feb. 21, 1931; a new one for molybdenum was described in the issue of July 13; the rapid determination of aluminum was covered on Aug. 17, and here is outlined a rapid procedure for titanium. The series will be completed by taking up the oxides of aluminum, silicon and chromium. Publication is by permission of the Executive Department of the Crucible Steel Co.

The gravimetric method herein described for titanium is based on the writer's fractional separation whereby Ti, Al, Cr, V, U, and Zr can be separated from the bulk of the ferrous iron by the simple expedient of adding 1:1 ammonia water to the reduced solution of these elements. He proposed this scheme 13 years ago.

The following facts are brought out:

1—A reliable gravimetric determination of aluminum can be carried through in Nitralloy types, in duplicate, in 5 to 6 hr. or less time.

2—An accurate analysis of the 18-8 steels and other types of high-chromium steels for titanium can be accomplished in duplicate in 2 hr. or less time by a suitable modification of the hydrogen peroxide color method. This technique has been successfully applied to the determination of Ti in highly alloyed chromium steels for more than a year in his laboratory. The analysis is made in the presence of the intense color of the high chromium.

3—An accurate umpire method is described for the gravimetric analysis of Ti. The scheme can be carried through, in duplicate, plus one control, in a total of 16 hr. No expensive chemicals, metals, or apparatus are needed.

made and the titanium and residual iron are dissolved off with 80 ml. 1 : 1 boiling HCl, and filters and pulps are washed until free of acid taste. These washed filter papers are now burned off in the weighed crucibles and the ash held. The solution and washings of the final peroxidation precipitates in the hot 1 : 1 HCl are now ready for the separation of the Ti away from the residual Fe by "thio."

Proceed as follows: To the solution and washings add 50 ml. 6 per cent H_2SO_3, then 1 : 1 NH_4OH to the warm solution, which will first turn red and then begin to decolorize if the solution is warm. Continue to add the NH_4OH carefully until the solution becomes milky with the Ti hydroxide, if the Ti is present to the extent of several tenths of 1 per cent.

When the solution smells very faintly of SO_2 and is nearly decolorized and, perhaps, a few small brown bubbles of ferric iron are showing, then add 20 ml. extra of H_2SO_3 and heat to boiling. Next add 10 g. of sodium-thio-sulphate and bring to a boil; then produce a cloud of white sulphur by adding 10 to 15 ml. of 1 : 7 H_2SO_4. Add just enough of the latter to cause the sulphur to coagulate; i. e., the S and Ti.

Then boil very slowly in a volume of 450 ml. for 40 min. to 1 hr.

Filter this mixture of S and Ti on to double 12.5 cm. filters, mixing in some ashless pulp—about a ¾-in. ball. One funnel per beaker is enough. Wash 60 times with 5 ml. H_2SO_3 per 500 cold water. Ignite this paper and precipitate in the same crucible with its ash that has been held. This ash constitutes the total TiO_2 plus several milligrams of Fe that are carried out with the Ti in the "thio" precipitation. Also some SiO_2 will be in the ash and a milligram or two of Cr_2O_3.

To purify this TiO_2, heat it first at a black heat with 10 g. of $K_2S_2O_7$ until any bubbling of the flux has subsided. Then raise the heat to dullest red on the bottom of the crucible. In a minute or two the ash will dissolve to a clear fluid. When the fusion is clear, which should take only 2 min., remove the crucible at once from the heat and let it cool. Prolonging the heat causes attack of the crucible and will contaminate the TiO_2 with some of the metal from the crucible, giving the final TiO_2 a slightly grayish cast. When the melt is cooled, place crucible and all in its 800 ml. beaker with 25 ml. 1 : 1 HCl and 150 ml. H_2O. Heat till the melt is dissolved. Remove crucible and lid, rinsing all surfaces carefully into the beaker.

The solution of the melt will dissolve in the hot acid, except some silica which is not filtered out. Cool the solution, add enough water to bring the volume to 400 ml. and add Na_2O_2 powder, the sulphur free brand, by shooting it under the raised lid of the 800 ml. beaker with a porcelain spoon which holds about 2 g. of Na_2O_2, as described in the method for Al in this series. The peroxide will cause a red color of Ti which will disappear as soon as the Na_2O_2 is in excess. Then add two spoonsful more and boil 10 min.; cool, filter off the total Ti as peroxide, through double 12.5 cm. filters. Wash with 1½ g. Na_2CO_3 in 500 H_2O—ten washings. Reject the filtrate.

Dissolve the precipitate of Ti as in the dissolving of the Cr and Ti and part of the Fe in the first fraction; i. e., with 50 ml. hot 1 : 1 HCl; wash free of acid taste, catching the solution and washings in an 800 ml. beaker. Add 25 ml. H_2SO_3 to this solution and then 1 : 1 NH_4OH exactly as in the first "thio"; i. e., until the solution smells only very slightly of SO_2, then 10 ml. more, and 10 g. of "thio" (volume 400 ml.).

Bring to boil, add 10 to 15 ml. 1 : 7 H_2SO_4 to throw out some sulphur, and boil about 40 min., till the latter coagulates. Then filter out the S and Ti through the same filters from which the Cr free peroxide of Ti was dissolved with hot 1 : 1 HCl. Wash 60 times with 5 ml. H_2SO_3 to 500 cold water.

Ignite the TiO_2 and weigh as TiO_2 and a little SiO_2. Add 20 drops of 1 : 3 H_2SO_4 and about 2 ml. HF and heat very cautiously on hot plate until heavy fumes of SO_3 appear and the residue looks like white enamel. Use a wide bottom platinum crucible (see Al method).

Then transfer this crucible, putting a tight fitting lid on it (this lid and crucible having been weighed together beforehand) to a support that is about 7 in. above a Bunsen flame 1-in. long. Increase the flame length very cautiously until SO_3 fumes appear again and so on until fumes cease. Then increase the heat to redness. This TiO_2

has a marked tendency to decrepitate violently if heated too fast and project bits of the oxide onto the lid, hence the necessity of a good fit of lid to crucible.

After reaching bright redness for 5 min., cool the crucible and weigh it when slightly warm to the first temporary constant weight. This will be the weight of the TiO_2 practically free of all SiO_2, Fe_2O_3, Cr_2O_3, and Al_2O_3. This weight is multiplied by 0.60×100 and divided by the weight taken to obtain the per cent of titanium. If the control sample is a milligram or two in excess of its added amount of TiO_2, deduct this excess from the steel being analyzed before making the percentage calculation, or vice versa.

The foregoing gravimetric method gives good recoveries of known amount of Ti added in solution to various high chromium steels and other alloy steels. It has been tested from 0.15 to 1.25 per cent Ti in this laboratory. Results check within 0.01 to 0.02 per cent Ti in the range mentioned.

Sources of Known Amounts of Ti

The writer has used two independent sources of known amounts of Ti—a convenient source he has had for years consisting of an 8 per cent soluble ferrotitanium, which also contains 3 per cent Al. The titanium was repeatedly checked by different operators by the old standard "thio" precipitation removing the Al by peroxidation.

Another independent source is 97 per cent TiO_2 furnished by the courtesy of the Foote Mineral Co., Philadelphia. This concern guaranteed the TiO_2 content to be 97 per cent. The writer checked this powder and found 97 per cent. It is evidently an air dried material.

This powder has been used for this work as it is easily gotten into solution. For an 0.40 per cent range of Ti, dissolve 0.025 g. of this TiO_2 in a platinum crucible by first pouring on the oxide 5 ml. of 1 : 1 H_2SO_4; then 2 ml. HF. Swirl this around to mix. Heat the crucible below boiling on the hot plate until it is clearly dissolved. Then gradually move the crucible to a hotter part of the plate until SO_3 fumes appear when the solution will be perfectly clear. Cool and rinse into the 800 ml. beaker. The drillings of the non-titanium steel are then weighed into this beaker and the solution is proceeded with. Add enough Al drillings to have the Al about the same as the steel to be analyzed, if you wish to save the yellow chromate filtrates for Al. It is better to run the Al on a separate portion. (See method for Al.)

There is no escaping these rather tedious details to get an accurate result in the presence of so much Cr and Al. It requires two 8-hr. days of the operator's time to put through a sample in duplicate and one control sample containing a known amount of added titanium. (This is much shorter, however, than the mercury cathode method, in our experience.) It is most fortunate that the color method to be described is quite as accurate as the gravimetric methods if properly conducted, and requires only one or two hours' time. I have checked the color method through all ranges from 0.15 to 1.20 per cent Ti, either by the cathode method or the gravimetric method just described, or by both.

Rapid Color Method

The gravimetric method is valuable, therefore, as a check or umpire method and for establishing standards for color work. It has been the writer's experience that the color method for Ti is accurate under all conditions if it is modified to suit color interferences of the Fe, Cr and V. It will check with the author's gravimetric process or the mercury cathode gravimetric method within 0.01 to 0.02 per cent of Ti. It is the only accurate method for titanium in these 18-8 or other high-chromium steels that is commercial. This is contrary to a recent work on the analysis of steel, which states that Fe, Cr, and Mo must be absent. The writer has found, as will be set forth, that high percentage of Cr is easily taken care of and that the presence of Mo, as high as 0.92 per cent Mo, in the method as given produces no color change.

The rapid color method for the accurate determination of Ti in 18-8 and similar high-chromium steels relieves the chemist of burdensome operations which any gravimetric determination of titanium in high chromium steels entails.

Dissolve 0.5 g. of drillings with 25 ml. of 1 : 3 H_2SO_4 in a 250-ml. beaker, heating gently until all steel is in solution. Then add under the cover glass, at the lip of the beaker, 5 ml. of conc. HNO_3. Remove the beaker from the heater for this addition. When violent action is over, boil slowly until red fumes are gone; then 5 min. more to a volume of 20 ml. Rinse down the cover glass and inner walls of beaker with a water jet. Cool the solution in running water to room temperature.

Have ready 10×1-in. heavy colorless glass test tubes of uniform bore and thoroughly cleaned by heating with 1 : 1 HCl and rinsing well with H_2O. Pour the test into this tube and add 10 ml. of a hydrogen peroxide solution. Decant this back and forth into the 250 ml. beaker. Swirl the solution around in the beaker each time, to mix the contents. No need to do any rinsing. Mark test tube to correspond to its beaker. Compare this test with an 18-8 steel to which has been added a known amount of soluble standard ferrotitanium, so that the Ti content of the standard does not differ from the unknown by more or less than 0.02 per cent titanium.

Do not try to dilute the test to match the standard, or vice versa, as this will give false colors, i. e., off shades. If, for example, on comparing the sample with the two standards, it is found to be lighter, i. e., bluer than 0.45 per cent standard but darker, that is more of a brown tint than 0.43, it is reported as 0.44 per cent titanium.

Certain precautions are taken: First, weigh the small amounts on a balance sensitive to ten divisions to one milligram. If the standard contains more chromium than the test, then enough dichromate is weighed in with drillings of the test to compensate for the chromium green color difference. If the test contains more chromium than the standard the dichromate is weighed in with the standard drillings. Volumes for comparison are 50 ml.

Color tests should be made arranged so that there is one standard mixture that looks slightly browner in tint than the unknown sample, and another standard that looks slightly bluer (high chromium color) than the unknown.

A convenient known source of Ti is to melt about a 30-lb. ingot of low-carbon steel containing about 2 per cent titanium or more and carefully determine the Ti content.

Iron gives a certain amount of color in the ferric state and should be taken into the color account. For example, if 30 mg. of 8 per cent ferrotitanium be added to a non-titanium steel, then automatically about 20 mg. of Fe are added, also, allowing for Al, C, and Si in the ferro. To the unknown, in this case, 20 mg. of ingot iron are added to make up for the iron carried to the standard by the ferro. Likewise, in strict work, the total ferrous difference between standard and test should be balanced in the same manner by totaling the non-ferrous elements in each steel, and add Fe to the one lower in Fe.

Vanadium interferes and must be absent, or compensated for. Fortunately not enough occurs in these steels as a rule to interfere. We check the steel to make sure of the absence of enough V to cause serious errors. V can be corrected for by adding V_2O_5 at the start if present in small amount. Usually not over 0.04 per cent V is found as a residual in 18-8 steels.

Molybdenum and Carbon Interference

In a recent publication, the statement is made that Mo gives color with H_2O_2 and therefore must be absent in Ti color tests. The following tests were made:

Steel	Per cent Mo.	Coloration
U. S. Bureau No. 106.....	0.16	none
No. 59317 5.36 per cent Cr.	0.34	none
No. 21,792 none	0.55	none
No. 3981 none	0.92	none

Evidently the foregoing color method suppresses Mo interference though a considerable percentage of Mo be present.

Carbon interferes seriously. See below under "Low Titanium Steel."

Routine Color Tests With Gravimetric Confirmations

Steel A being a steel of unknown Ti percentage, an 18-8-steel, looked bluer than a standard made by weighing in with 0.5 g. of an 18-8-steel containing no Ti 0.012 g. of 8-per cent ferrotitanium.

Steel A showed slightly browner than a similarly made up standard containing 0.010 g. of the 8 per cent Ti.

Calculations for "A"

0.011 × 0.08 × 100 ÷ 0.5 = 0.176 per cent Ti.

0.010 × 0.08 × 100 ÷ 0.5 = 0.160 per cent Ti.

Reported 0.16 per cent Ti.

At a later date, by the mercury cathode method, 0.15 per cent Ti was obtained; being an average of two determinations.

Steel B, 18-8. This steel was found by a trial run to be 0.40 to 0.45 per cent Ti. It was then compared with 0.028 and 0.029 g.of 8 per cent Ti. It showed bluer than the 0.028 and browner than the 0.029.

0.028 × 0.08 × 100 ÷ 0.5 = 0.448 per cent Ti.

0.029 × 0.08 × 100 ÷ 0.5 = 0.464 per cent Ti.

Reported 0.45 per cent Ti by color.

Later by the mercury cathode, an average of two gravimetric runs gave 0.46 per cent Ti.

By the author's gravimetric method, later, were found the following for B: 0.45, 0.44, 0.45 per cent Ti.

Steel C: This steel was found to be close to 0.66 per cent Ti by color. Further runs narrowed its range to between 0.043 g. and 0.045 g. of 8 per cent Ti, i.e., bluer in tint than 0.043 and browner in shade than the 0.045.

0.043 × 0.08 × 100 ÷ 0.5 = 0.688 per cent Ti.

0.045 × 0.08 × 100 ÷ 0.5 = 0.72 per cent Ti.

Reported 0.69 per cent Ti by color.

An unchecked result by the cathode gave 0.66 per cent Ti.

Steel B, high titanium. This steel was found to be browner than 0.076 g. of 8 per cent Ti and more of a bluish color than 0.078 g. of 8 per cent Ti. Therefore, D's titanium content is between 1.216 and 1.245 per cent by color, and was so reported. Some weeks later D was run by the author's gravimetric scheme and 1.22 and 1.23 per cent Ti were obtained, based on known amounts of 97 per cent TiO_2 dissolved and added to an 18-8-steel without Ti.

In this high Ti range, some operators may find it easier to see color difference in Ti, by taking an 0.25-g. sample for the analysis instead of 0.5 g. This steel was tried, both with 0.5 and 0.25-g. and the same results were obtained. The same amounts of acids, etc., were used in the 0.25-g. as are given for the 0.5-g.

Three different operators in the laboratory were tested and all experienced no difficulty in seeing the color difference in night or day light. The brown color obtained as described for Ti fades very slowly. Several hours later, standard mixtures and tests showed the same relative differences. An outside laboratory has also reported very satisfactory experience with this color method in 18-8-steels.

Compensation Mixtures for Differences in Percentages of Cr and Fe

For Steel D, an 18.50 per cent Cr. 18-8 non-Ti steel was used with:

0.072-g. 8 per cent Ti + 0.5-g. 18-8 non-Ti + No $K_2Cr_2O_7$

0.074-g. 8 per cent Ti + 0.5-g. 18-8 non-Ti + No $K_2Cr_2O_7$

0.076-g. 8 per cent Ti + 0.5-g. 18-8 non-Ti + No $K_2Cr_2O_7$

Steel D being 17.53 per cent Cr. steel:

0.50-g. of D + { (0.014-g. $K_2Cr_2O_7$ / (0.050-g. ingot iron

Confirmations of Color Results by the Gravimetric Process

Steel F:

0.21 per cent Ti by color

0.20 per cent and 0.208 per cent Ti by author's gravimetric method

Steel G:

0.40 per cent and 0.41 per cent Ti by color

0.42 per cent and 0.43 per cent Ti by author's gravimetric method

The results were seriously and recently disputed on G by another laboratory, but later three laboratories agreed on the results here given for G, including the runner-up.

Steel "08" was reported as 0.48 per cent Ti by color and disputed as being 0.19. Later three laboratories agreed as follows:

Laboratory No. 1, 0.48 per cent Ti by color
Laboratory No. 2, 0.46 per cent Ti by gravimetric method
Laboratory No. 3, 0.48 per cent Ti by gravimetric method

Carbon Color Interferences and Low-Titanium Steel

An 0.05 per cent titanium steel with 0.90 per cent chromium was determined by color by comparing it with a standard mixture consisting of an 0.18 per cent chromium steel to which was added 0.010-g. of $K_2Cr_2O_7$ to compensate for Cr difference. This steel was chosen because its carbon was the same as the unknown titanium steel. Carbon differences interfere seriously with titanium color work, giving a brown color.

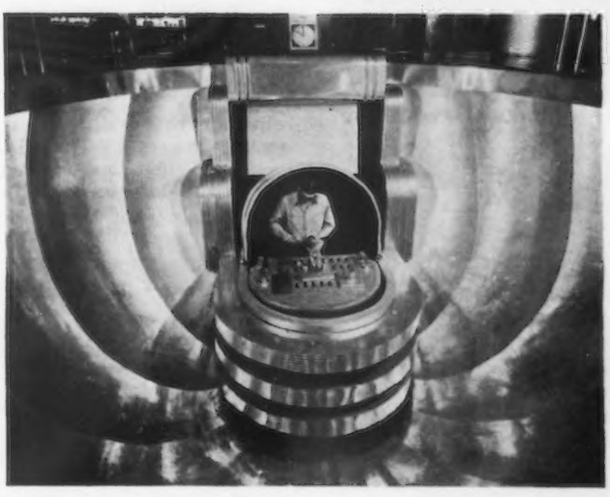
For standard, this base mixture was used: 0.50 g. of 0.18 Cr steel + 0.010 g. $K_2Cr_2O_7$. To one base mixture was added 0.002 g. of 8 per cent ferrotitanium and to the other 0.003 g., and to a third 0.004 g. There was a large color difference between the 0.002 and the 0.003 g. of 8 per cent Ti, i.e., a large color spread for 0.08 mg. of titanium.

The unknown matched, exactly the 0.003 standard, i.e., the titanium percentage found equal to 0.003 g. x 0.08 x 100 ÷ 5 = 0.049 per cent Ti. For synthetic standards use steels that are within 0.02 per cent carbon of the steel being tested.

H_2O_2 Solution

Weigh quickly 5 g. of Na_2O_2 into a dry 800 ml. beaker. On this pour, all at once, a mixture of 125 ml. of 1:3 sulphuric acid and 500 ml. of H_2O. Stir promptly. Store in a glass stoppered bottle. This solution will keep a long time in a cool place.

Spectacular Welding Exhibit at Fair



OXY-ACETYLENE welding and cutting are spectacularly demonstrated in the sunken amphitheater that forms part of the Union Carbide & Carbon Corporation's exhibit in the Hall of Science of the Century of Progress Exposition at Chicago.

Visitors look down into a huge metal bowl which is flooded with light from concealed sources. As they watch, an opening appears in the base of the bowl, revealing a workman actually using a cutting and welding outfit. After each welding demonstration the lights fade out, the demonstrator disappears and a short motion picture is thrown on the screen to illustrate other applications.

The exhibit is highly instructive; those now employing oxy-acetylene welding may learn of new applications, and those who have not used it can obtain comprehensive information about both welding and cutting.

Car-Bottom Annealing Furnace Installations

By H. M. HEYN
Assistant Sales Manager,
Surface Combustion Corpn., Toledo, Ohio

DURING the last few years the demands for better products and the design of improved gas-burning equipment by industrial furnace manufacturers have done much toward the perfection of the car-bottom furnace. A study of various installations throughout the country may well show that they range in size from 36 to 28,000 cu. ft. in volume. On account of this very large range in size and the various locations of these furnaces, it can readily be seen that all cannot be successfully fired with any one type of fuel. Gas is used where flexibility of control, ease of operation, adaptability to automatic control, and uniform distribution of heat are required. Furthermore, with a gas-fired unit, little floor space is used on the majority of installations, as combustion chambers are eliminated. Firing to obtain uniform temperatures longitudinally as well as vertically of the furnace chamber can best be accomplished by utilizing automatic proportioning gas burners.

An 18 x 80-ft. Furnace

One of the outstanding, and understood to be the largest gas-fired car-bottom furnace in the world, was recently built by the Sun Shipbuilding & Dry Dock Co., Chester, Pa. This particular furnace is used for annealing large steel castings and stress relieving in welded work, such as pressure vessels. The inside length is 80 ft. and inside width 18 ft. Sixty-two two-stage high-pressure burners supplied by Surface Combustion Corpn., Toledo, Ohio, are used in firing the furnace. Over and under firing is used with these burners and they are staggered to eliminate hot spots and to give uniform temperatures throughout the chamber.

The burners are automatic proportioning, thus assuring a constant atmosphere in furnace at all times, whether burners are operating at maximum or minimum pressures. The gas used is of 530 B.t.u. content at 10 lb. pressure. Each burner has a capacity of approximately 600 cu. ft. an hour, or a grand total of about 38,000 cu. ft. for all burners. A large turndown range allows the use of all burners for temperatures of 1100 to 1600 deg. F. as well as the higher ones of 2000 to 2400 deg.

As the type of burner is well suited to automatic control, it was an easy matter to utilize automatic valves on this installation. The furnace is divided into five heat zones, comparable to a loaf of bread cut into five equal parts. Each zone consists of 12 burners, six on each side, all controlled by means of a couple and an automatically operated fuel supply valve. The importance of temperature control in this furnace is well indicated by the fact that 16 temperatures are recorded while 12 points are connected to indicating instruments.

Large Furnace Uses 20-lb. Natural Gas

Approximately two years ago, the Surface Combustion Corpn. was called upon to recommend the proper firing equipment to be used on a large car-type furnace being built by Babcock & Wilcox Co. After due consideration of furnace construction, type of work to be annealed, and fuel available, it was decided to use two-stage high-pressure burners. This type burner was recommended because natural gas was available at 20 lb. pressure, thus eliminating purchase of fan to furnish air for combustion, as with the high-pressure system all the air for combustion is entrained at the burner. With the high-pressure system of firing, only one line is run to each burner to supply fuel and the size of temperature control valves is smaller, consequently less expensive. As the furnace was to operate over a wide range of temperature and ton-

nage, it was necessary to have burners with a wide range of turndown. As the two-stage burners have a turndown of 8 to 1, there was no difficulty in operating over the wide ranges mentioned. The temperature range is 1200 to 2200 deg.

The furnace measures 16 x 60 ft., with 16 ft. from car top to top of arch. The casing is of steel plate construction, reinforced by buckstaves and lined inside with insulating firebrick. This type of lining has very high refractory as well as insulating qualities, insuring minimum of maintenance and heat losses. Forty-eight burners are used for firing, having a combined capacity of 37,000 cu. ft. of natural gas an hour at a pressure of 20 to 25 lb. per sq. in. To insure uniform temperatures throughout furnace, six zones are used, each 10 ft. long. An individual automatic control valve and recording controller serve to maintain a constant temperature in each zone. The use of over and under cross firing with burners staggered prevents flame impingement on work being heated, and furthermore, sets up a re-circulation of hot gases so that heat is uniformly distributed around the work.

The development of short-flame tunnel burners has made it possible to build a furnace of minimum width, to use over and under cross firing, to do away with doghouses, pits, and longitudinal combustion chambers. All of these important factors must be considered in the design and firing of any car type furnace regardless of size. So far in this article we have dealt primarily on the larger type installations, as used for tank and pressure drum annealing, employing the two-stage type high-pressure burner. However, the smaller annealing furnaces used for small castings and bar stock deserve due consideration in this article.

Different Types of Burners Available

Of the many complete car-type furnaces installed by our company during the last few years there are probably no two exactly alike from a standpoint of size, work treated, temperature range, type of burners and kind of gas fuel used. Many plants have natural gas at high or low pressure, some have producer, city, or coke-oven gas, while some may use butane gas.

With all these various gaseous fuels available at different pressures, the furnace manufacturer is always confronted with the problem of developing a satisfactory burner for each fuel and for high or low pressure. Once the burners are developed it is a matter of selecting the proper burners to cope with the situation at hand. Inasmuch as the two-stage high-pressure burners have been fairly well covered in the preceding paragraphs, it is well to outline the various types of burners that are being

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DATA on the performance of recent car-type annealing furnaces feature the accompanying article, which also outlines recent practice in this field. The author emphasizes the flexibility of this class of furnaces, both large and small, in respect to the variety of gaseous fuels they may utilize and in respect to the control, automatic and otherwise, that may be achieved with them.

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used on many other installations. They are as follows:

1. Low-pressure inspirator type using tunnel burners. Gas can be natural, coke, city, or butane.
2. High-pressure inspirator type using tunnel burners. Gas can be natural, coke, city, or butane.
3. Low-pressure velocity burners; coke, city, natural, or butane gas.
4. Low-pressure two-stage velocity burners; gas, coke, city, natural, or butane gas.

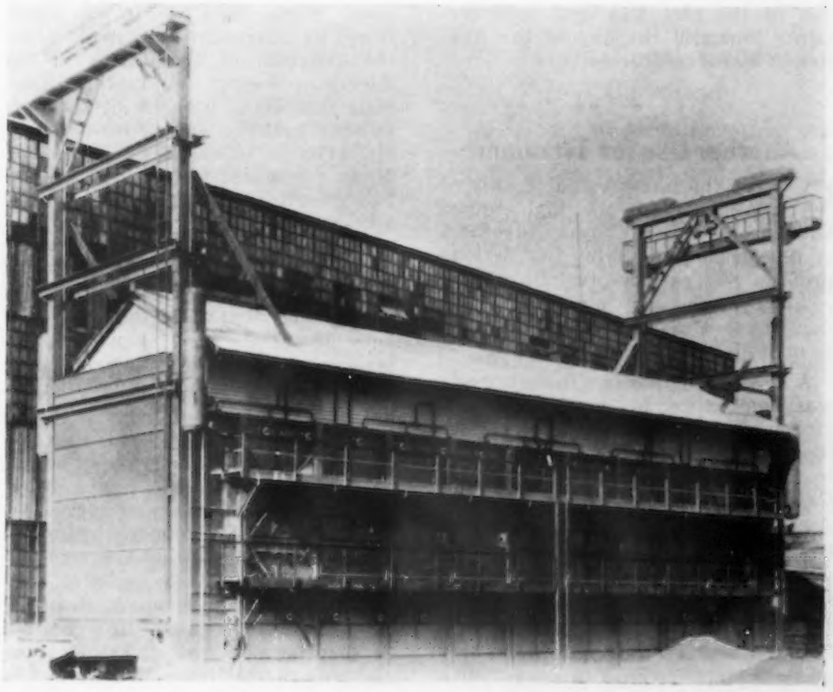
With all these different types of burners available, it is not a difficult matter for the furnace manufacturer to supply the user of car-type furnaces with the best of firing equipment regardless of kind of gas supplied in his plant.

Several of the car-type furnaces that have been built recently were equipped with two sets of burners, namely, one set for heating up and the other for holding. This arrangement of firing has worked out very satisfactorily on an installation recently made in the plant of a prominent steel casting manufacturer. The high-pressure inspirator tunnel-type burners are used on this installation and are automatically controlled by a three-point recording controller working in conjunction with two motor operated valves in the gas line. The purpose of the three-point recorder is to control both sets of burners. At the "low" setting, both the holding and heating up burners are on full, at "intermediate" the heating burners are cut out entirely and the holding burners are on full, at "high" position of controller the holding burners are cut down to their minimum setting.

This arrangement of two sets of burners gives an ideal condition in that the heating-up time is much less and control at temperature is not disturbed by temperature running too high. Another unique feature on this job is that of an automatic damper arrangement, which controls pressure and atmosphere in the furnace. In the designing of the furnace all the small flues were run into a common header, the outlet of which is covered by an adjustable automatic damper. On the old type furnace the usual method of blocking flues was for the operator to place a brick or tile over openings. This was not done in most cases, consequently a large amount of excess air was drawn into furnace, causing use of more fuel and excessive scaling of the stock. With the use of an automatic damper operating in conjunction with heat control equipment, it is possible to maintain a desired atmosphere and a back pressure in the furnace at all times while any of burners are operating.

The damper is automatically raised to its maximum opening by a motor

(*Concluded on Page* 52)



New Things in Materials and Pr

Widening Interest in Rustless Steels

PROBABLY no other products in so short a time—a little over 20 years since their discovery—have found their way into so many American industries as have the rustless steels. Among the uses and processes in which they have gained a large place should be mentioned chemical manufactures, acid-making, the building trades, the dairy, brewing, pulp and paper and the oil industries, and, in particular, those industrial developments requiring materials capable of withstanding high temperatures and pressures and also corrosive action. In these instances, rustless steel has solved many problems; it has in fact made some processes commercially possible and others more efficient.

One illustration not often cited will serve to emphasize the value to industry, and to the nation, of rustless steels. Prior to their discovery, the only large source of nitric acid—so essential in the manufacture of high explosives—was Chile saltpeter. Because one of the rustless steels was found to resist all attacks of the acid, it has been found possible to build large towers and accompanying apparatus of this steel so that commercial nitric acid can now be made in indefinite quantities from the nitrogen of the air. The new steel certainly hastened the day of the fixation-of-nitrogen process.

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Another Use for Titanium

ONE of the latest valuable uses of titanium is in the high-chrome and chrome-nickel alloys. Advocates of its efficiency in solving that serious problem — carbide-precipitation in rustless steels—are numerous. The facts have already been briefly commented on in these columns.

A new use of titanium in such steels was emphasized by J. H. Critchett, vice-president, Union Carbide & Carbon Research Laboratories, New York, in his paper, "Chromium in Steel Castings," at the recent convention of American foundrymen in Chicago. In the production of the 4 to 7 per cent chromium steel castings, it has been found that the addition of titanium results in marked benefits.

The 4 to 6 per cent chromium cast steels naturally have a longer life than ordinary steels. The addition of fairly large amounts of titanium (0.70 to 0.90 per cent Ti in a 6 per cent Cr steel) further increases the life of the plain chromium steels, says Dr. Critchett. If the carbon is kept very low and a titanium addition made, the life is notably increased. A still further advantage of a titanium addition is that the ordinarily very low elongation and reduction of area of the 4 to 6 per cent Cr steels, owing to the air-hardening properties caused by the chromium, is largely overcome. The effect of the titanium is to eliminate almost entirely the air-hardening property so that greater ductility results. Special heat treatment still further enhances the physical properties.

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Large Use of Copper in Copper Steels

THAT copper is taking a prominent place as an alloying element in copper-bearing steels is emphasized by the fact that an increasing amount is being consumed for that purpose. An authoritative estimate is that the annual consumption in the United States in this category is now about 2500 gross tons. This includes that for all steels containing from 0.20 and 0.25 per cent to 1.00 per cent and over. Some years ago it was established by exhaustive tests made under the direction of committees of the American Society for Testing Materials that about 0.25 per cent copper in steel bestows anti-corrosive properties under atmospheric conditions. Many verbal battles were fought before results were finally established and agreed upon. The efficacy of copper in this role is now generally recognized and large quantities of such steel are being used. In recent years steels containing high percentages of copper have been found to possess especially advantageous properties after certain heat treatments.

Undoubtedly more will be heard about copper in steels because research in this field is now active. Despite the fact that there is a difference of opinion among authorities as to whether a low-copper steel (0.25 per cent) is an alloy steel, preponderance of testimony is to the effect that it is. In any event competition among alloy steels is active and it would not be surprising if new alloys of copper and iron or steel were to appear. In fact, there is one development in this line which is near maturity and which will create wide interest when made public.

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Columbium Enters the Metallurgical Picture

IN an article on accelerated corrosion tests (THE IRON AGE, July 27) V. B. Browne, vice-president in charge of research, Allegheny Steel Co., says:

> While there are a number of elements which, if added to this alloy [18 and 8] influence the rate of dissociation (and perhaps also the form and composition of the constituent which is precipitated at the grain boundaries), it has been the writer's experience that columbium is the only element which apparently accomplishes this purpose without seriously affecting the inherent corrosion resistance.

Testimony of a similar nature was recently made public as being the experience of the Union Carbide & Carbon Research Laboratories. This laboratory has been investigating columbium in this role, as well as titanium, vanadium, molybdenum and other metals and it has been most favorably impressed with results from the incorporation of columbium (about 0.35 per cent) in 18 and 8. Another leading laboratory has had similar experiences.

Very little has ever been heard of columbium in steel metallurgy. It is possible that this rare element will soon join the procession of those other elements which are proving so valuable, as small additions, in rectifying certain difficulties and improving certain properties of rustless and other alloy steels and alloys.

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A Precipitation Hardening Copper Steel

ANENT the copper steels, it is recalled that an excellent paper was presented at the February meeting of the mining engineers on new properties of 1 per cent copper steels, developed and brought out by precipitation hardening heat treatment. It was demonstrated that the results of recent researches have shown some excellent properties in these steels, easily obtainable by varying the heat

Processes ▲ ▲ ▲

By EDWIN F. CONE

treatments. Their possible uses were also emphasized.

This paper is but another example of the striking improvements now obtainable by subjecting various alloys and alloy steels to precipitation hardening—a comparatively new process in the heat-treating art. The aluminum, magnesium and beryllium alloys are cases in point. More will be heard of this processing.

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Copper Steels and the Alloy Steels

IT is well to realize that the intensive cooperative research between the Copper and Brass Research Association and other organizations is finding new uses for copper. It is also intensifying the competition among the various promoters of alloying metals. Over against the efforts of the copper people is the unremitting research of the chromium, the nickel, the vanadium, the molybdenum and other interests. While the possibilities in each case may be limited, the activity is healthy and productive. Through it, either new alloy steels or combinations of the various alloying elements are discovered, many of which prove to have properties of distinct value to industry. Special heat treatments also enter the picture with the result that special engineering applications are served.

Greater use of alloy steels is certain to be a definite result of all these studies. It is becoming increasingly evident that alloy steels are in the ascendency and among these are numbered the rustless steels.

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Shall We Call It "Gas Alloying"?

CAN a gas be alloyed with a steel to produce products having unusual properties? There are those who claim so. One metallurgical friend has termed the phenomenon: "gas alloying."

Dr. Critchett's paper, referred to in another paragraph, has announced that the addition of certain fixed percentages of nitrogen to the cast alloy steels containing over 20 per cent of chromium bestows great benefits and overcomes serious defects. Ordinarily such steels tend to form large columnar grains in the castings and also to

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ANOTHER budget of comments on developments in the materials field is here presented by Mr. Cone. It follows a similar assembly of items in THE IRON AGE of July 13. Informal discussions of the kind allow for giving the metal working industry advance hints as to new things and methods which here and there may profoundly affect industrial products and processes.

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be subject to grain growth when held at high temperatures for very long periods.

It has been demonstrated that the addition of appropriate amounts of nitrogen to these steels entirely overcomes the first difficulty and materially reduces the second one. The interesting statement is made that the nitrogen is added through the medium of a special high-nitrogen ferrochromium, but no details are given as to how this special ferroalloy is produced. The amount of nitrogen recommended is one part for every one hundred of chromium. Marked increases in ultimate tensile strength and yield point are caused by the nitrogen as well as pronounced benefits in the elongation and reduction of area.

This development is truly remarkable. It tends to throw some doubt on the contention that nitrogen is a detriment in steel in general. At any rate, more will be heard of "gas-alloying."

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Something New In Ingot Molds

A NEW development in ingot molds which promises, from researches thus far conducted, to have far-reaching effects in the steel industry is on the horizon. Details are not yet available. A metal mold has been experimentally tried out in several plants. Some of the benefits include a smoother surface of the ingot, greatly limiting the necessity for chipping; a smoother bottom at the base of the ingot, decidedly reducing the amount of discard and more rapid cooling due to the heat conductivity of the metal of the mold. The greater cost is expected to be offset by the advantages outlined as well as longer life of the mold itself.

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A Definition of Alloy Steel

REFERENCE was made in these columns in the issue of July 13 to the subject of "What is an Alloy Steel?" The following definition has come to my notice:

> An alloy steel may be considered as one that, through the addition of metallic elements other than those present in plain carbon steel, or by a very considerable increase in the metallic elements, silicon and manganese, commonly present in plain carbon steel, possesses a marked difference in physical characteristics (mechanical, electric, magnetic, etc.), or resistance to atmospheric or chemical action either at normal or at elevated temperatures, from plain carbon steel.

This is from a reply to a questionnaire which the writer has conducted on this controversial subject, sent to a group of American authorities. This definition seems to be as nearly complete as possible, though there are many others received which are excellent. No doubt there are some who will not subscribe to the one quoted: A report on the survey itself will be published.

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An International Conclave on Corrosion

AN event of large import is scheduled for early September. It is the International Convocation on Corrosion, which is part of the regular fall meeting of the Electrochemical Society at Chicago, Sept. 7 to 9. In direct charge of Dr. F. N. Speller, of Pittsburgh, an authority on corrosion, and backed by a society which has so successfully conducted many noteworthy symposiums, this conference is sure to be highly fruitful.

A number of distinguished foreign investigators are submitting manuscripts and some of them will probably be present in person. Such names as Dr. Ulrick R. Evans, who heads the European committee; A. W. Hothersall, of England; Dr. Lobry de Bruyn, of Holland; Professors Chandron and Herzog, of France; Dr. K. Daeves and Dr. Manfred Ragg, of Germany; and L. Hajda, of Czechoslovakia are on the program. A great deal of discus-

sion, pregnant with experience and opinion, is expected.

Though corrosion is an old subject and though there have been countless meetings and papers dealing with it, the problem in its many sided aspects baffles complete solution. Rustless steels, the white metals and other alloys are taking their part to win the battle, but new advances in materials and applications of materials bring needs for fresh onslaughts.

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A Malleable Iron Theory Exploded

"CHROMIUM is a poison in malleable iron castings"—a theory or opinion has had many advocates for many years. From facts presented before the American Foundrymen's Association at its June convention in Chicago, this theory has evidently been exploded.

The major part of the credit for this denouement in malleable iron practice goes to a young woman metallurgist of Chicago, Miss Rebecca Hall. In her paper, "High-Strength and Wear Resistant Malleable Cast Iron," she demonstrates that, in an effort to develop a wear-resistant malleable iron, she experimented with the effect of chromium additions *plus* silicon control. Chromium additions ranged from 0.25 to 1.15 per cent with the silicon varying from 1.02 to 2.02 per cent. Maximum tensile strength was secured with 0.84 per cent chromium and 1.57 per cent silicon. Elongations decreased and hardness increased as the chromium increased. There were no variations from the standard heat treatment for malleable.

Thus another step has been taken in controverting an old prejudice.

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Insulating Open-Hearths

ONE is commonly astonished, when the announcement of some simple improvement is made, that the step was not taken before. This observation was emphatically impressed on the writer when, at the last meeting of the American Iron and Steel Institute, he listened to the paper by E. F. Entwisle of the Bethlehem Steel Co., on "Insulation of Open-Hearth Furnaces."

Mr. Entwisle showed that the operating savings, after complete insulation of a furnace, were 12 to 15 per cent. Late in 1932 there were four plants which had completely insulated furnaces—seven in one plant and one each in three others. Within the last half year at least 20 other plants have completely insulated a furnace—usually only one—and at present they have these in operation. As the life of an open-hearth furnace increases, the loss of heat through thinning walls is a source of large waste which means loss of money.

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Pipe of Non-Metallic Material

PIPE of a new material has been introduced to the American market by Johns-Manville, New York. Asbestos and cement are the two ingredients which go to make up the new pipe. These are combined under pressure into a homogeneous structure of extreme density, according to the company. The pipe has the trade name "Transite." It is described as chemically inert, immune to the action of ordinary soil acids and alkalies and also as unaffected by tubercular growth and electrolytic action.

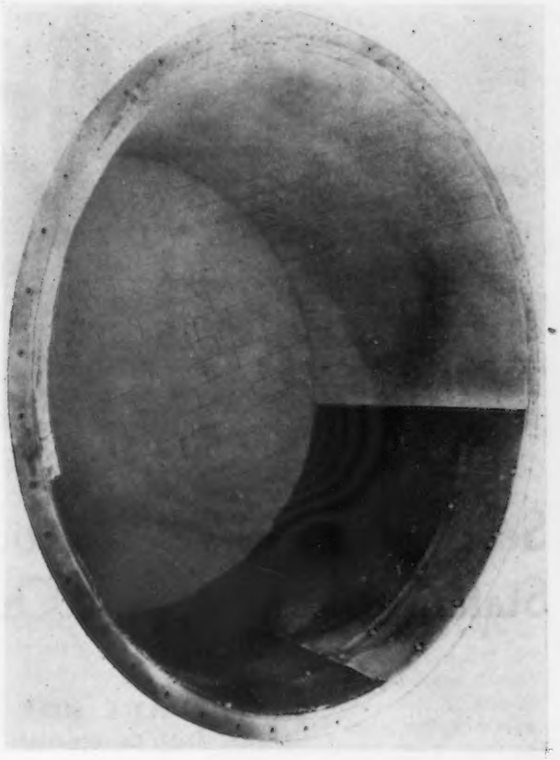
Plastics are competing with certain metal products and there is now the probability that the new pipe material may offer competition with metal pipe. An interesting fact is that it originated in Italy where it has been manufactured and extensively used for several years. The American product is basically the same but has been modified to meet the requirements of American practice. It is made in large diameters and long lengths and is offered as available not only for water carriage but also for handling corrosive liquids and gases. The product represents one of several which are putting the spurs to metal producers to combat competition and to overcome the replacing of metals with non-metallics.

Welds Defective Casting Without Disturbing Set-Up

IF a small blow-hole or other defect appears when a steel casting is being machined, particularly on a finish cut, it is expensive to remove the casting from a machine tool, such as a boring mill, and have it repaired and reset in the machine. At the East Pittsburgh works of the Westinghouse Electric & Mfg. Co., the practice is to call a welder to the boring mill and repair the casting without removing it from the fixture. The time for repairing the casting shown in the illustration was 10 min. By calling the welder to the machine, instead of sending the casting to the welding shop, the time, about 3½ hr., required to remove the casting from the mill, set it up again in the mill, and true it up with an indicator was saved.

The dominance of electric steel castings in the steel casting field is shown by these ratios: In 1932, 46 per cent of the tonnage of steel castings made in the United States came from the electric furnace, and in 1931, 34 per cent, while the average for 1928, 1929 and 1930 was 27.5. The ratio was 15 per cent in the early 1920's and 7.57 per cent in 1918.

Steel Tanks Are Lined With Non-Absorbent Acid-Resistant Vitreous Blocks



A NEW method of lining steel containers to make them acid resistant is among recent developments of the Patterson Foundry & Machine Co., East Liverpool, Ohio. The lining consists of white vitreous non-absorbent blocks, dense in structure and corrosion resistant. They are made of Porox, a product of the Patterson company, the use of which heretofore has been confined largely to linings for mills used in food, drug and chemical plants. The manufacture of the block is said to require the same careful method of preparation that is used in the manufacture of the highest grades of china. Subjected to 72-hr. firing the clay is changed in part to a crystalline product which is claimed to be insoluble in acids and not affected by alkalies. Wear-resisting qualities are enhanced by a high silicon content, and the blocks, it is claimed, will withstand severe, continuous or intermittent impact.

A new white acid-proof, quick-setting Porox cement has been developed for use with these blocks and a method has been devised in applying the blocks to the tanks by which the cement holding the blocks is reinforced with wire netting or expanded metal welded to the inner surface of the container that is being lined. Because of the resistance to chemical action, containers lined with these blocks may be used, it is claimed, in nearly all chemical processing, as well as in the manufacture of lacquers, paints, foods and various other products.

The Patterson company recently built a battery of tanks lined with these blocks for the Mount Clemens Pottery Co., Mount Clemens, Mich. The installation consists of four glazed tanks, 7 ft. 6 in. in diameter by 5 ft. deep and ⅜ in. thick, the tanks being equipped with agitators. After the steel tanks were fabricated, an expanded metal lining was spot welded to the inner surface The interior of the tanks was then given a protective coat of asphalt paint and the under side of the tank tops, manhole openings and manhole covers were covered with ⅛ in. of lead.

The installation of the lining was done on the job after the tanks had been mounted on their concrete foundations. The expanded metal lining was gradually covered with cement and the blocks set in place. Due to the reinforcement of the expanded metal, a strong bond is developed between the shell and tile. The interior of these tanks has a pure white surface which is said to have all the acid and chemical resisting characteristics of porcelain and maximum resistance to abrasion.

Modern Packaging for Ground Steel Hobs

MODERN packaging methods have been adopted by the Barber-Colman Co., Rockford, Ill., in preparing their high-speed steel ground hobs for delivery to the customer. The hobs are shipped in an attractive dark blue tin box of approximately square section with rounded corners and having a slip cover. Spaces are provided on one side so that the specifications of the hob may be written in at the time it is packed, and so that the box may serve as a permanent storage place for the hob on the tool room shelf of the purchaser. Specifications are written with a special ink, which withstands handling, oil, etc. The box carries the admonition, "This is a precision tool. Keep it sharp. Keep it in this box when not in use," thereby calling attention to the value of the product which is enclosed. Removable sheet metal spacers are employed to center it and prevent the hob from hitting the sides of the box. The box will accommodate hobs up to 3½ in. x 3½ in., and provisions are made for packing smaller sized hobs by using spacers with different hole-size studs and by using corrugated board shims at the top and bottom of the package.

Material Handling & Engineering Co., 100 Rutledge Street, Brooklyn, has recently taken over the business of the More Handy Truck Corpn. and will continue the manufacture of this line of trucks. Improved models will be offered.

Sectional Panel Construction for Service Stations Creates New Outlet for Steel

By HARRY E. EIBER
The Austin Co., Cleveland

A NEW market for steel which eventually will be a sales factor in several major industries has been developed by our engineers. The market includes the oil and gas industry, the dairy industry, the baking industry, the laundry business and many others. The product is a standardized steel frame structure with porcelain enamel exterior.

The field to which we first turned was the gas and oil business. Our first contracts were the design and construction of service stations for the Kendall Refining Co. and the Goodyear-Wende Oil Corpn., a subsidiary of the Texas Corpn. Both of these jobs were in Buffalo.

Steel tonnage for an average size station approximates 30 tons, which includes sheet steel of various gages and some structural material. Foundations may be of concrete or steel beams. Other steel products include interior partitions, sash, doors and roof deck.

The adaptability of these structures to other industries where cleanliness or attractiveness is a sales factor can be readily appreciated. Advertising value is unsurpassed. Standardized design and color combinations insure instant identification. Conspicuous space is available for trademarks, signs, emblems and slogans.

In the construction methods to date, we have fabricated the steel wall sections of large areas in our own plant, and shipped them to the site for final assembly on the job. These sectional panels reach the site with provision for door and window framing. Individual members are spot welded in our shops, and the panels are bolted together in the field.

When fitted together, the backs of these steel panels form solid interior walls, similar to flush-type partitions. These walls can be finished in any color, or at the owner's option porcelain enamel also may be used for the interior wall.

The roof deck is of long span construction, which eliminates unsightly purlins, bar joists and similar types of design. It also is insulated against heat and cold. A suspended ceiling is used in the office portion of the station. Obviously, the entire structure is fire-safe.

On the average size station, all steel work, including the walls, partitions and roof deck, can be erected in three days' time. The porcelain enamel can be placed in two days. Slight additional time is required for completing the station, including glazing and interior finishing.

The porcelain enamel panels are available in varied sizes, and the construction process permits many types of architectural design and color combinations. These panels are securely held to the steel walls by a patented method, a l means of fastening being completely hidden from view. There is no exposed steel; there are no exposed bolts or screws that might rust. The exterior surface is a solid front of enamel finish.

Every porcelain unit has a heavy thickness of insulating board cemented to the back. This stiffens the panel and eliminates metallic sounds when the wall is tapped. As a further assurance of positive insulation, the space between the steel wall panels and the porcelain exterior is filled with rock wool—giving double insulation, or more than is provided in the normal brick wall used in service station construction.

The porcelain enamel exterior was designed to be weather tight; it had to be thoroughly insulated against heat, cold and sound. The enamel surface also had to be in lasting colors, easily cleaned and without panel effects or crevices to catch dirt.

The buildings are permanent yet movable, particularly suited for short-term land leases. The structures can be dismantled, transported and re-erected if desired. But they are sound, rigid buildings that will stand indefinitely with minimum maintenance costs.

Rotary Highway Guard Made of Steel Pipe

STEEL pipe is used effectively as an agent of safety in a rotary safety highway guard that has been developed by the Machined Steel Casting Co., Alliance, Ohio. The horizontal rotary members of this guard are 6-ft. lengths of 4-in. standard welded steel pipe. Steel braces, placed at 6-ft. intervals, are made of 12-in. 50-lb. I-beams. A steel pin is shrunk in one end of the pipe, and a steel pin socket is shrunk in the other end. The pipes are fitted together, and supported at the junctions by the braces which are anchored in concrete by four steel bolts. The company has also developed an application of this guard for installation on existing wooden guard fences, using 8-ft. lengths of standard welded steel pipe.

Rotary highway guard in which horizontal members are made of 6-ft. lengths of steel pipe. Impact can be only with the tires of a car; fenders and running board will clear the guard.

Welded Steel Used for Diesel Engine Structures

By EVERETT CHAPMAN
Vice-president, Lukenweld, Inc., Division of Lukens Steel Co., Coatesville, Pa.

ONE factor which has prevented the Diesel engine from assuming its rightful place as an important prime mover in transportation units has been its excessive weight. The transportation field, including marine and railroad work, has been closed to the Diesel because of its usual specific weight ratio ranging from 42 to 250 lb. per hp. Many successful applications have been made in marine and railroad yard service but these installations have included only the most probable ones. The possible and likely applications, such as main line passenger and freight service on the railroads, have been untouched.

A great deal of the weight of a Diesel engine is intimately connected with that part of the structure—the crankcase—which functions to connect the main gas load with its reaction point, the main bearings. The combination of high combustion pressures and large piston diameters results in loads of large magnitude. The strict requirement of structural rigidity, coupled with the fatigue nature of the load, demand that the usual cast material be worked at low stresses, which results in the excessive weight figures that are usual practice today. The tension nature of the load, imposed on a material that is not well suited to tension loading, results in a composite structure consisting of steel tie rods connecting the main bearings with the cylinder heads. These rods are in turn surrounded by a cast iron structure which supplies the necessary rigidity for minimizing vertical deflection due to the gas loads and the horizontal components resulting from the inertia loading of the crankpins and rods.

Two Properties of Steel Permit Weight Reduction

The first step in the reduction of the weight of the usual arrangement naturally contemplates the use of steel instead of cast iron as the structural material. Steel, with a modulus of elasticity of 30,000,000 in contrast to cast iron with a modulus of 12,000,000, can provide a structure of similar section working at the same stress as the old one, but with only 40 per cent of the deflection. Turning this another way, it means that the steel structure can be worked at two and one-half times the stress of the cast iron structure, and yet retain the same rigidity. Care must be taken in applying this figure in actual design work, since only those areas which are axially loaded can be reduced by any such amount. In the redesign of members subjected to bending, it is the moment of inertia of the section that is reduced by 40 per cent, and this new value is used in the redesign of the section.

The other physical characteristic of steel which enable a lighter-weight construction is its higher endurance limit as a fatigue-resisting material. Steel's higher ultimate strength is not a controlling factor since the engine must not break. Its higher yield point is of no advantage because the structure is useless if a permanent set occurs. Its superior ductility is important only as an index to the cleanliness of the steel. It is, therefore, obvious that the modulus of elasticity and endurance limit of steel are the only two factors that permit reduction in the weight of a Diesel engine crankcase.

▲ ▲ ▲

USE of welded steel for the crankcase and other parts of Diesel engines, with a lowering of weight per horsepower, was discussed in a paper presented at the meeting of the oil and gas power division of the American Society of Mechanical Engineers, held at Atlantic City, N. J., Aug. 23. The first section of the paper, here presented, outlines the general advantages of welded steel crankcase construction, and also the major questions of stiffness and endurance life. The second part, to be published in an early issue, includes actual examples.

The Lukenweld Company, of which Mr. Chapman is a vice-president, was recently awarded the contract to furnish the welded steel frame, oil pan and cylinder heads for the 600-hp. Winton engine that will be used in the new high-speed passenger train of the Union Pacific System.

▼ ▼ ▼

Stiffness and Endurance of Welded Diesel Crankcases

Any questions that may be asked on the application of welding to Diesel engine crankcases center about two prime requisites, stiffness and endurance life, plus a secondary factor —corrosion-resistance—which affects only those marine installations where salt water is used as a cooling medium.

Questions concerning structural rigidity are answered by the fact that steel is the stiffest commercial material known to man. Further, the flexibility of the welding process enables the designer to use economically efficient sections that have been impractical in other manufacturing methods. Thus, the matter of requisite rigidity is controlled entirely by the designing department.

When the structural constants are properly handled, the designer can achieve a structure either of equal stiffness and lighter weight than the old design or obtain a structure of higher rigidity at the same weight. The intelligent designer who will delve into the possibilities of welded steel construction will find that the flexibility of the process enables him to go further in exercising his ingenuity than any process he has ever used. Theoretically perfect distribution of the material is limited only by the designer's ingenuity and those features of the old construction which are incapable of change. The design of welded steel crankcases is best approached with an open mind. It is a fact that must be faced that all structures are compromises with mechanical and mental hazards, and so are not perfect. It is only through recognition of this fact that design progress is made.

Several Points of Maximum Stress

The problem of endurance life can be rather simply stated although the subject as a whole is somewhat involved. In handling the severe loading conditions encountered in Diesel

engine work over an equitable period of time, it is necessary to study thoroughly the mechanism of fatigue failure. The essence of the matter is that the range through which the component materials can be repeatedly stressed indefinitely without causing failure must be known. The maximum stress in the structure, wherever it occurs, must be under the known safe value. A low average stress as usually calculated cannot possibly guarantee an indefinite service life. It is the maximum stress which governs.

A point of maximum stress may lurk in a hidden corner with too sharp a radius. It may exist in the bottoms of small tool marks. It may be present at undercuts unconsciously made during the welding process. It may be found at any small blow-holes or porosity in the materials. In particular, in the welding process, points of maximum stress always exist around an improperly designed welded joint. In an otherwise perfect design satisfying the rigidity requirements for successful functioning of the engine, the only thing that will break the structure subjected to repeated load is the existence of a hidden, minute defect in contour which multiplies the average stress condition by a factor of five, six, or even more. Points of high local stress are evident only as fatigue failures. Such points of high stress occur over such small areas that they have no influence on rigidity. Ductility cannot operate to alleviate a high stress condition as it does in statically-loaded structures, since this phenomenon requires a permanent deformation which is inadmissible in a crankcase that must preserve main bearing alinement.

The diagram, Fig. 1, depicts the repeated stress performance of an alloy steel which has been found most applicable to welded steel crankcases. It is a steel of low-carbon content and, therefore, well suited for welding. The curve shows it to have an endurance limit (as determined on a rotating beam machine) of 50,000 lb. per sq. in., as contrasted with the equivalent value of 30,000 lb. per sq. in. for ordinary mild steel plate. A definite limiting range of stress at which the material will function for an indefinitely large number of reversals has been proved to exist for all materials. If the engine is not to fail prematurely, but is to serve indefinitely, the product of the average working stress and the stress concentration factors (always introduced during fabrication) must not exceed this safe stress range—50,000 lb. per sq. in. in this case.

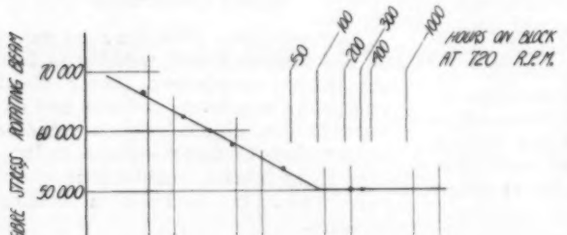
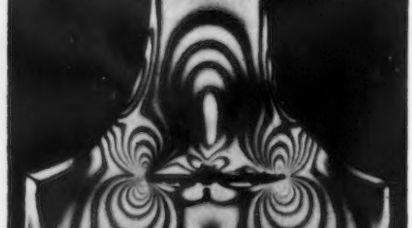


FIG. 1—Diagram depicting repeated stress performance of an alloy steel found most applicable to welded steel crankcases.



FIGS. 2 and 3—Photoelastic pictures (above) of stress distribution around a common type of welded joint.

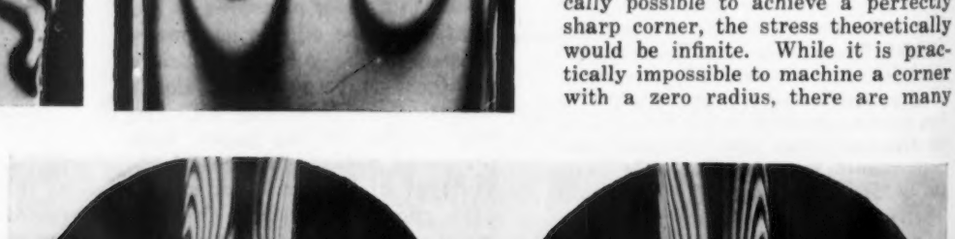


FIG. 4 — Photoelastic study showing the stress distribution around a concave weld fillet as compared with the stress distribution around a fillet with a triangular cross-section.

Stress Concentrations from Holes and Sharp Corners

Stress factors of almost any magnitude can exist in a structure. A round hold in a body of material will raise the stress in its locality by a factor of 2.7. A round hole on the surface of a material will raise the stress three times. These factors are not serious since the demands of rigidity will call for average stresses which, when multiplied by these factors, will not constitute a source of worry. The serious type of stress concentrations, against which the designer must guard diligently, are those exemplified by sharp corners and reentrant angles.

Mathematically, the stress concentration factor which exists at a corner or reentrant angle is inversely proportional to the radius of curvature of the corner. If it were practically possible to achieve a perfectly sharp corner, the stress theoretically would be infinite. While it is practically impossible to machine a corner with a zero radius, there are many

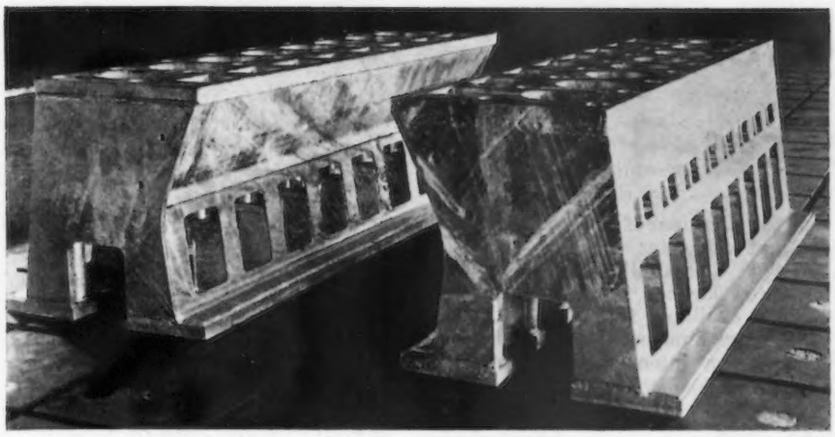


FIG. 5—(Above) Two 500-hp. four-cycle marine engine crankcases with galvanized water jackets.

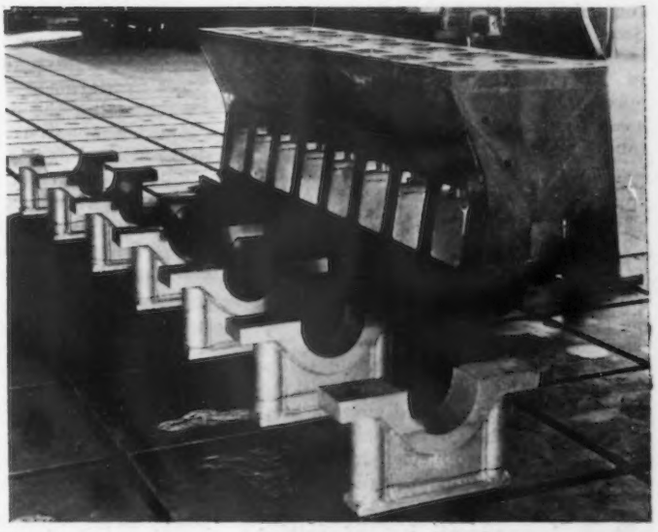


FIG. 6—Four-cycle marine engine crankcases with welded bearing girders.

types of welded joints in which the radius is nearer zero than can be approached by machining. Concentrations of this nature cannot be tolerated.

Figs. 2 and 3 illustrate, photoelastically, the stress distributon around an all too common type of welded joint. When two plates are superficially welded, either by two welds whose roots are not fused together or by fillet welds merely laid in the corners, there is an unwelded boundary on the interior of the joint. This crack is an integral part of the contour of the joint and has a tremendous influence on the stress distribution. This condition can be simulated elastically by cutting, from a piece of Bakelite, the contours of the joint, including the internal crack. This specimen, when loaded and viewed by polarized light, shows the stress distribution that would exist around a similar welded joint. The concentrations which exist in the actual welded joint are even more severe. The saw blade used to cut the internal crack has a finite width, whereas the smallest dimension of the crack in the welded joint is practically zero, due to the tremendous contracting forces exerted by the cooling weld metal.

Concentrations of this nature in poorly designed welded joints have broken more welded structures than any other single cause. Such joints will function properly in statically loaded structures, since the high ductility of the weld metal can allow sufficient plastic deformation, under high load, to correct the contour. They are suicidal, however, where the structure is subjected to repeated stress.

Another Type of Notch Effect

Another type of notch effect which may occur in a welded structure, and is a typical example of the things a designer and fabricator must guard against, is shown in Fig. 4. It is a photoelastic study contrasting the stress distribution around a concave weld fillet with the stress distribution around a weld fillet with a triangular cross section. The triangular fillet shows marked concentrations at the ends of the weld. The concave fillet shows an evenly graduated stress, with the maximum value probably only two or three times that of the average stress. The concentration factor at the ends of the triangular weld can reach dangerous values. While the triangular-shaped weld fillet has more throat area, and, therefore, a lower average stress, the maximum stress which exists is considerably higher than that around a concave fillet, although the average stress of the latter is higher because of its decreased throat.

Other points to be considered are the condition of the weld, the endurance value of the weld metal, and the damage to the base metal by the high temperature of the welding operation. Heat treatment after welding is exceedingly important, not only to correct the damage occurring during welding, but also to remove the residual stresses which are locked up in the structure. There is direct evidence that residual stresses may reach 30,000 lb. per sq. in., which is nearly the yield point of ordinary material. If the structure is unfortunately loaded in the same direction as the residual stresses, there is no apparent strength.

The other important phase of stress relief is that an unannealed welded structure will exhibit unseasoned properties worse than the greenest casting ever encountered. It will warp and twist on the planer and boring mill to a degree that will render the structure useless. It will not hold its shape over any period of time. Instances have been known of unannealed welded structures which, over a period of two years, crept badly out of shape in service. A multiplication of difficulties occurs at the edge of the weld where the metallurgical damage coincides with the severe discontinuities in weld contours. Undercutting is quite common with many electrodes in the hands of an inexperienced welder. With an undercut and its attendant stress concentration occurring just at this damaged zone in the parent metal, failure under repeated stress is certain. Other types of stress concentration occur in welded structures and they must also be eliminated.

The general subject of corrosion resistance of the weldable materials can be amply covered by the statement that there are many weldable materials with remarkable resistance to salt water corrosion. The flexibility of the welding process enables incorporation of these materials in the structure, where they are necessary. The admirable record of wrought iron hulls in salt water could be duplicated in the water jacket of a welded-steel crankcase. The stainless steels, nickel-clad steel and other clad metals, are all possibilities. Two of the early welded engines were galvanized in the region of the water jackets and a two-year record in salt water service has shown them to be entirely adequate. Fig. 5 shows two 500-hp., four-cycle marine engine crankcases with galvanized water jackets.

(*Concluded on Page* 51)

Steel Framing for Small Residences

DURING recent years the subject of steel houses has aroused keen interest among architects, builders and real estate men, and this interest has been widely reflected in the magazines and the daily press. At the steel house forum, sponsored by the American Institute of Steel Construction last year, many systems of construction were presented by their advocates as offering a panacea for ills of the housing industry. Some investigators have assumed that the future of steel in residences lies in the so-called pre-fabricated or mass production house. Others have asserted that the solution is to be found in the utilization of standardized parts. A contribution to the subject has now been made by the United States Steel Corpn. in the form of a booklet entitled "Steel Framing for Small Residences," which is predicated on a somewhat different procedure.

The compilers of the booklet evidently believe that the future development of steel in this field will be found in houses of individual, non-standardized design, as distinguished from the mass production house, and they look to architects, builders, and local fabricating shops as the natural and most promising avenue of exploitation.

A study of the present booklet indicates that the policy followed by the steel makers forty years ago in the field of tier buildings is revived with suitable modifications to meet the particular needs of the small residence. The policy then consisted in making available a suitable variety of rolled steel sections, with simple rules and tables to facilitate their use, and encouraging a large number of architects and engineers to make such application of them as the individual character of each structure dictated. The application of this policy to residences has the merit of making available for immediate use by a large number of people the results of an intensive study of the present problem based on experience accumulated over many years in other fields.

The new book on the steel frame house is the outcome of a survey made by a trade research committee drawn from subsidiary companies of the Steel Corporation for the purpose of investigating the demand for steel in residence construction. Nearly 100 different systems of construction were studied, and a number of the residences built in accordance with these systems were inspected by representatives of the committee. The following conclusions were indicated:

1.—There exists a widespread interest in steel-framed residences. The principal demand is for small one and two-family houses of individual design.

2.—Steel can be advantageously used in the construction of residences of any architectural style or arrangement to provide a frame that will not shrink, is inherently non-combustible, sanitary and rigid, resists the destructive attack of insects, and can readily be made permanent.

3.—Certain new practices can be employed with safety and economy in the design of the steel framework for small residences along lines not contemplated in current engineering handbooks.

4.—With the aid of suitable information the steel framework can be designed by architects as readily as in the case of older forms of construction.

5.—The details of the steelwork can be developed to advantage in cooperation with the personnel of a fabricating shop located in the vicinity of each job.

6.—The fabrication and erection requirements are simple and are well suited to the equipment of the smaller structural or sheet metal shops.

Differences in Conditions of Use of Steel in Tier Buildings and Residences

FEATURE	TIER BUILDINGS	RESIDENCES
Loading	Dead exceeds live	Live exceeds dead
Bracing effect of material enveloping the steel framing	Disregarded in design	Utilized in design
Computation	Loads and reactions considered individually	Loads and reactions averaged
Vertical members	Columns, having low ratio of slenderness, continuous through several stories	Studs, having high ratio of slenderness during construction, only one story high
Horizontal members	Spandrels one panel long	Girts continuous through several panels
Floor thickness	Comparatively deep	Shallow
Floor deflection	Usually negligible	Usually critical
Fabrication	Somewhat elaborate	Simple
Erection medium	Derricks	Man-power

A COMMITTEE appointed from subsidiaries of the United States Steel Corpn. studied nearly 100 systems of house construction using steel. The findings are embodied in a booklet printed for distribution among those actively interested. This is intended, in a measure, as a supplement to the shape books available for the design of bridges and buildings, so that it may be regarded as a handbook of information on the use of steel in residences. For example, it contains the first publication of a table to aid in the design and computation of thin sheet metal sections.

New Table for Thin Sections

The booklet specifically aims to provide architects, builders and fabricators with convenient information on the safe, practical and economic use of steel in the framework of small residences. The new practices are explained and subjected to rule, and the manner in which they can be applied is exemplified. By means of detailed steps, drawings and photographs, one section of the booklet shows how the arrangement and sizes of all the steel members needed in framing a typical house may be easily determined. Its pages also illustrate a number of framing systems composed either of standard structural shapes or of sheet metal, and it presents for the first time a table that should be helpful in the design and computation of thin sheet metal sections. The construction used in the residences illustrated will doubtless suggest to the architect and builder many other variations in construction methods.

In order to simplify the design of steel framing for residences, rules for proportioning individual members are given, and specially arranged tables of safe loads make their selection an easy matter. The difference between the conditions which govern the use of steel in tier buildings and in residences is emphasized. Some of these differences are indicated in the table.

A selected group of steel products suitable for residence framing is listed for ready reference, containing the following:

Structural shapes, including two new light-weight beam sections.
Plates, both sheared and universal.
Pipe for column purposes.
Hot-rolled strip.
Annealed sheets.

The booklet is of 56 pages, 8½ x 11 in. in size. Copies may be secured from the sales offices of the subsidiary companies of the United States Steel Corpn.

What Columnists and Economists Ought to Know About Steel

G. L. LACHER
Managing Editor,
The Iron Age

By G. L. LACHER

POWER without responsibility is a dangerous thing. And nowhere is such power for harm better exemplified than among newspaper columnists and economic oracles. These wielders of the pen feel privileged to pass final judgment on anything and everything, and they are answerable to no one except the general public. When a popular columnist says that the "steel magnates don't know the first thing about their business" or an economic service declares that steel prices are too high because they are not in "equilibrium" with other prices, injury is done not only to a great industry but to the country at large. No one wants a muzzled press, but a constant bombardment of misrepresentation grows tiresome, particularly when it comes from those who are aware of their immunity so long as they do not make directly libelous statements.

The art of writing is a difficult one to master, but ability to arrange words or statistics in a pleasing or convincing style should never be confused with capacity to make industry's wheels go 'round. Of course, the critic's stock defense is that he doesn't have to lay eggs to know good ones from bad ones. He does not add that he might be more useful if he did lay an egg.

We have all heard the story of the attorney who was so eloquent in arguing a case that he convinced himself. And many of us suspect that columnists and economists gain such proficiency in weaving phrases and spinning theories that they are themselves awed by the final products of their endeavors.

High-pressure salesmanship had its day but is now passé. The public built up resistance to it. The phrase hero and the economic oracle are still in vogue. But in time we shall become inoculated against them also.

Meanwhile leaders of the steel industry, harassed by responsibilities at every turn—responsibilities to employees, to stockholders, to communities, to the Government—have neither the energy nor the time to defend themselves from the missiles being thrown from the bleachers. And it may be that they do not fully appreciate the necessity of giving some attention to public relations. Having lived through a period of exceedingly disastrous competition, they cannot understand how anyone could be so ignorant of the steel industry as to allege that its prices are controlled. Having suffered gigantic losses, they cannot see how anyone can charge that steel prices are too high.

Steel Prices Compared with Finished Commodity Index

Yet these charges have been and are being made. Two weeks ago the writer took occasion to refute the claim of a nationally known newspaper columnist that steel prices had been held at "artificially high levels." Far from being kept high, steel prices were shown to have been deflated substantially as much as prices of all other manufactured products. Steel prices reached their high of modern times in 1917, when THE IRON AGE composite for finished steel was 4.188c. a lb. Finished products generally attained their high in 1920, when the Department of Labor index was 149.8. The decline in steel prices to the depression low of 1.867c., reached in April and May of this year, was 55.4 per cent. The recession in the finished products index to the depression low of 65.7, reached in February, March and April of the current year, was 56.1 per cent.

Raw Materials Consumed and Assembly Cost Per Gross Ton of Products Produced

Year 1914 Compared with 1933

	Approximate Gross Tons Raw Materials per Ton Fin. Prod.	Assembly Cost per Gross Ton of Product		
		1914	1933	Per Cent Increase Over 1914
Plant A:				
Structural shapes	4.08	$4.51	$7.56	67.9
Rails	4.09	4.51	7.57	67.8
Bars	4.16	4.60	7.71	67.7
Plant B:				
Universal plates	5.07	5.73	9.05	58.1
Sheared plates	5.03	5.67	8.97	58.1
Bars	5.07	5.74	9.05	57.9
Wire rods	5.01	5.67	8.96	58.1
Plant C:				
Structural shapes	3.38	4.60	7.35	59.8

Freight Rate Increases Bear Most Heavily on Steel

These figures show virtual equality in the amount of price recession. But, as a matter of fact, price deflation in steel has been much more severe than in many other industries. The reason for this may be summed up in one word—transportation. Some industries do little more than "convert" raw material into a finished product, with relatively little waste of material in the operation. Others must assemble a large quantity of raw materials to produce a relatively small quantity of finished product. Increases in freight rates bear much more heavily on manufacturers of the latter type.

For the sake of illustration, let us assume that one manufacturer uses 1½ tons of raw material to produce 1 ton of finished product and another requires 5 tons of raw material to get 1 ton of output. If freight rates on the raw materials are increased 20c. a ton, the increased cost for the first company is 30c. per ton of finished product made while that for the latter is $1 a ton, or more than three times as much.

Steel companies belong to the "assembling" category of manufacturers. From 4 to 5 gross tons of raw materials must be assembled to produce 1 ton of finished steel. As a consequence freight rate increases have been especially burdensome to the

steel industry. A recent survey of steel companies in Official Classification territory discloses that transportation costs on material entering the production of 1 ton of steel are now 60 to 80 per cent higher than in 1913. A separate study of three large steel plants, given in the table, compares present transportation costs with those of the year 1914. In this case the increases range from 57.9 per cent to 67.9 per cent. However, the costs shown do not include the emergency rate advance which has been in effect since early in 1932. It is estimated that inclusion of the surcharge would add 1 or 2 per cent to the percentage increases shown.

But if we merely take the figures shown in the table, we find that present transportation costs average $8.28 a ton as against 1914 costs of $5.13. The increase is $3.15 a ton, which is 7½ per cent of the average selling price for steel at its recent depression low of $41.82 a gross ton (IRON AGE composite).

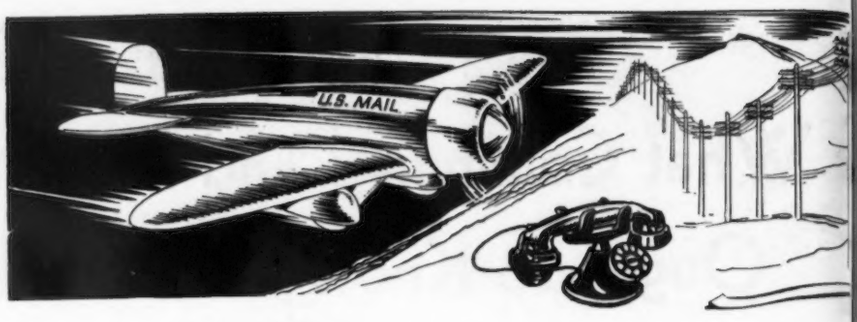
What a Deduction of Freight and Wage Increases Shows

This increase in cost is a reality that steel companies must face. Similarly increases in labor costs are a stark reality. If the steel industry were freed from heavier labor and transportation costs, it could sell at prices far below pre-war levels. The increase in labor costs since before the war has been close to $10 per ton of finished product made. Specifically, a study made by a steel company last year showed current labor costs of $15.90 a gross ton as compared with costs of $5.45 a gross ton in 1915. If, therefore, we deduct $10 for increased labor costs and $3 for increased transportation cost, our depression low of $41.82 a gross ton is reduced to $28.82. This is well below the lowest level of this century—$30.60 a gross ton (1.366c. a lb.)—which was reached in December, 1914.

This extraordinary showing should make it clear, even to columnists and economic equilibrists, that "steel magnates" have learned plenty concerning their business, particularly concerning the necessity of selling at abnormal prices—not prices that are abnormally high, as charged by the uninformed, but prices that have been ruinously low.

Foundry Equipment Index for July

THE index of net orders for foundry equipment for July, as reported by Foundry Equipment Manufacturers Association, was 48.6. This compares with 45.5 for June, 1933, and with 18.7 for July of 1932.



▲ ▲ ▲ THE NEWS OF THIS WEEK

British Arrange Free Importation Of Noncompetitive Machinery

LONDON, ENGLAND, Aug. 22 (*By Cable*).—Licenses may now be issued permitting the free importation of machinery such as is at present not procurable in the United Kingdom. Comprised in the list of equipment in this category are certain types of machine tools, presses, metal and woodworking equipment, agricultural, dairy and wire-working machinery, foundry equipment, food sterilizing and food preparing apparatus and chemical machinery.

In the steel trade, a holiday week is in progress on the Northeast coast, but the stoppage is not complete, since demand is livelier than usual this season. Wabana iron is being exchanged for Welsh coal. Tinplate is arousing more inquiry but the present rate of bookings barely equals the production rate. United Kingdom consumption has increased considerably this year, but exports for the first half of the present year are down 18,000 tons despite increased shipments.

Canada, Australia, Brazil and Argentina are inquiring for 30,000 tons of galvanized sheets to be used for locust destruction. British mills expect to secure this business.

The Continental steel market is still feeling the effect of last week's holidays, Belgian mills suffering particularly from lack of business. Due to this they have again cut the price of thick plates to United Kingdom markets.

The attempt to draft a basis of collaboration between Dutch export merchants and the Belgian sales syndicate has been unsuccessful and efforts by the European steel cartel to regulate Norwegian imports of iron and steel have been thus far inconclusive.

British and Continental prices remain unchanged from last week.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open hearth	£5	to £5 7s.	6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	16s.	9d. to 17s.	3d.
Steel bars, open-hearth	£7	17½s. to £8	7½s.
Beams, open-hrth.	£7	7½s. to £7	17½s.
Channels, open-hearth	£7	12½s. to £8	2½s.
Angles, open-hearth	£7	7½s. to £7	17½s.
Black sheets, No. 24 gage	£9		
Galvanized sheets, No. 24 gage	£11	to £11	10s.

Continental Prices, f.o.b. Continental Ports

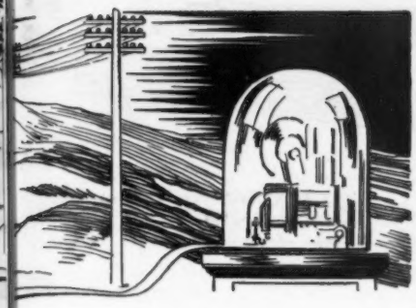
Per Metric Ton, Gold £ at $4.86

*Ingots	£2	5s.	
*Billets, Thomas	£2	7s.	
Wire rods, No. 5 B.W.G.	£4	10s.	
Black sheets, No. 31 gage, Japanese	£11	5s.	
*Steel bars, merchant	£3		
*Sheet bars	£2	8s.	
Plates, ¼ in. and up	£3	18s.	6d.
*Plates, ⅛ in. and 5 mm.	£4	1s.	
*Sheets, ⅛ in.	£4	6s.	
*Chip plates	£4	10s.	
*Beams, Thomas	£2	16s.	6d.
*Angles (basis)	£3		
Hoops and strip steel over 6-in. base	£3	15s.	
Wire, plain, No. 8	£5	7s.	6d.
Wire nails	£5	15s.	
Wire, barbed, 4-pt. No. 10 B.W.G.	£8	15s.	

*Prices as established by European Raw Steel Cartel.

Job Galvanizers Form Association

A PERMANENT organization of jobbing galvanizers under the name of the National Galvanizing Association was formed at a meeting held in Atlantic City a few days ago. The organization started with a mem-



HIS WEEK ▲ ▲ ▲

bership of 30 whose plants comprise 60 to 70 per cent of the volume of jobbing galvanizing in the United States. The new association will conduct work in the interest of the industry and in addition will prepare a code for the industry.

The officers are: President, Thomas M. Gregory, Hanlon & Gregory Co., Pittsburgh; vice-president, G. H. Koven, L. O. Koven & Bros., Inc., Pittsburgh; directors, Albert Ross, Ross Galvanizing Works, New York; J. P. Cattie, Joseph P. Cattie Bros., Philadelphia; F. C. Rogers, Rogers Galvanizing Co., Blue Island, Ill., and F. A. Olmstead, Chain Products Co., Cleveland; treasurer, Paul S. Daugherty, Metal Coating Corpn., Chicago. Stuart J. Swensson was appointed secretary and will be located at the association's headquarters which will be at 605 American Bank Building, Pittsburgh.

Combustion Engineering Reorganized

AS of August 1, 1933, Combustion Engineering Co., Inc., a newly organized company, took over the properties of International Combustion Engineering Corpn. and affiliated companies recently sold by order of the Federal Court. The properties acquired include those of Combustion Engineering Corpn., Hedges-Walsh-Weidner Co., Coshocton Iron Co. and Raymond Bros. Impact Pulverizer Co. In order to assure the best possible service to the company's customers, these properties will be operated under a single centralized management.

The new company will continue Combustion Engineering Corporation's complete line of fuel burning, steam generating and related equipment which includes all types of stokers, pulverized fuel systems and boilers, as well as water-cooled furnaces, economizers, air preheaters, ash conveyors and hoppers.

The officers of the new organization are: Frederic A. Schaff, president; Joseph V. Santry, executive vice-president; Robert M. Gates, vice-president in charge of sales; Martens H. Isenberg, vice-president in charge of production; John Van Brunt, vice-president in charge of engineering; Harold H. Berry, treasurer; George W. Grove, secretary and assistant treasurer; George D. Ellis, comptroller.

Caster and Floor Truck Manufacturers Organize

THE Caster and Floor Truck Manufacturers' Association was organized on a permanent basis at a recent meeting held in Chicago. Articles of association, by-laws and a code of fair practice for the industry were unanimously adopted. Officers and directors were elected and the secretary was authorized to establish his headquarters at 60 East 42d St., New York.

The officers and directors elected are as follows: President, J. F. Thomas, general sales manager, Nutting Truck Co., Faribault, Minn.; vice-president, Hall Kirkham, receiver, The Colson Co., Elyria, Ohio; secretary and treasurer, John A. Cronin, 2020 Lincoln Building, New York; Directors: (for three year terms), M. T. Williams, managing director, Bond Foundry & Machine Co., Manheim, Pa., and N. L. Jarvis, president, Jarvis & Jarvis, Inc., Palmer, Mass.; (for two year terms), William H. Noelting, vice-president, Faultless Caster Co., Evansville, Ind., and Ezra Clark, vice-president, Clark Tructractor Co., Battle Creek, Mich.; (for one year term), L. C. Conner, partner, Orangeville Manufacturing Co., Orangeville, Pa., and Hall Kirkham, The Colson Co.

A. O. Smith Corpn. Reopens Pipe Mill

A. O. SMITH CORPN., Milwaukee, is reopening its pipe mill after being idle nearly two years, late in August, to handle an order for 10,000 tons of 10-in. electrically welded steel pipe for a 195-mile oil line in the Southwest. Neither the name of the buyer nor the location of the line has been disclosed. The pipe mill is now being conditioned for the run. While its reopening means a substantial addition to the payroll, the approximate number of men to be recalled has not been compiled.

Job Stampers Join Metal Federation

THE Pressed Metal Institute held a meeting with an attendance of 30 at the Statler Hotel, Cleveland, Aug. 17, to consider the adoption of a code for the job stamping industry. It was decided to affiliate with the recently organized Metal Products Federation and a master code that has been drawn up by the Federation was approved with minor modifications. The by-laws of the Federation were also approved. Groups of stampers in certain special fields that feel the need of additional code regulations plan to prepare supplemental codes but these will not conflict with the provisions of the basic code.

Steel Fabricators Hold Code Meeting

A tentative code of fair practice for the steel construction industry was endorsed by representatives of 460 steel fabricating companies at a conference of the American Institute of Steel Construction at Hotel Schenley, Pittsburgh, on Aug. 16.

The tentative document, which was prepared by the group's board of directors, follows the provisions of the iron and steel code as consistently as possible.

The committee which drew up the industry's code includes Mr. Conley; C. Edwin Michael, Virginia Bridge & Iron Co., Roanoke, Va.; W. M. Wood, Mississippi Valley Structural Steel Co., Decatur, Ill.; R. P. Hutchinson, Bethlehem Fabricators, Inc., Bethlehem, Pa.; L. A. Paddock, American Bridge Co., Pittsburgh, and G. H. Blakeley, McClintic-Marshall Corpn., Bethlehem, Pa.

Wire Machinery Builders Organize

THE Wire Machinery Builders Association was organized on August 10 at a meeting held in New York, at which the following were present:

Philip M. Morgan, Morgan Construction Co.; L. A. Vaughn, Vaughn Machinery Co.; George D. Hartley, Sleeper & Hartley, Inc.; J. A. Kreitler, H. J. Ruesch Machine Co.; Josiah Judd, Thomson-Judd Wire Machinery Co.; A. R. Petterson, Thomson-Judd Wire Machinery Co.; W. D. Pierson, Waterbury Farrel Foundry & Machine Co.; E. F. Shuster, F. B. Shuster Co.; E. J. Scudder, E. J. Scudder Foundry & Machine Co.

A Constitution and a set of By-Laws were adopted and officers were elected as follows:

President, Philip M. Morgan; vice-presidents, L. A. Vaughn, Josiah Judd; secretary and treasurer, George D. Hartley. Executive committee: W. D. Pierson, E. F. Shuster, L. A. Vaughn, E. J. Scudder. Code committee: J. R. Dorer, A. R. Petterson, W. D. Pierson.

The members present agreed upon the essential elements of the code which it was voted should be submitted through Machinery and Allied Products Institute, with which the association voted to ally itself.

THIS WEEK IN WASHINGTON

Steel Institute's Original Code Accepted With Minor Changes

To Undergo 90-Day Trial, Beginning At Once—Authorizes 48-Hr. Week After Nov. 1 If Operating Rate Is 60 Per Cent. Minimum Wages Unaltered.

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, Aug. 22.—The iron and steel industry of the United States enters upon a "new era" on Aug. 29, when it will begin operating under a code of fair competition. To be supervised by the Federal Government, this revolutionary shift from established private control became assured late last Saturday night when President Roosevelt signed the steel code. For call it what one may, this placed the steel industry under unprecedented governmental authority, as is contemplated for all industries of the country by the Industrial Recovery Act. Such vital economic elements as wages, hours of work, labor conditions, etc., have become matters of Federal jurisdiction. The success or failure of this movement variously known as "Government-business partnership" and "socialization of industry" is held to rest more largely with its administration by the Government than with industry itself. Recognition of the realities of problems of industry and permitting their application rather than attempted enforcement of unsound and arbitrary dicta are seen as a form of cooperation that is essential to satisfactory working of the new principle.

Despite sensational stories in the daily press regarding the "spanking" the Government had given the steel industry, the actual fact is that the Government, in a five-day conference with steel executives last week, accepted a code that is but little different from that submitted by the American Iron and Steel Institute after the open shop declaration had been struck out at hearings held on July 31. It is likewise true that both National Recovery Administration officials and steel executives expressed satisfaction over the outcome of the weary day and night discussions. They undoubtedly were marked by conflicts, at times perhaps rather sharp, and there were intermittent reports of "deadlocks" and plans of the Government to write the steel code, just as it had previously written the petroleum code and was grappling with the troublesome coal and automobile codes. It is said that some steel executives as well as certain Government representatives at periods of the discussion over the steel code thought the White House would have to "step

The Steel Code as Accepted

THE steel code, as accepted by the President, differs but slightly from the original code submitted by the institute and reprinted in full in The Iron Age of July 20, pages 26-N to 32.

Following are the changes:

Article IV, Section 2, relating to employee representation plans, was voluntarily withdrawn from the subject matter at the time of the public hearing. The various sections of Article IV are therefore renumbered in accordance with this omission, the original Section 3 becoming Section 2, and so on.

In the original Section 3, (now Section 2), the portion formerly reading "none of the members of the code shall cause or permit any employee to work at an average of more than 40 hr. per week in any six months' period" now contains the additional clause "or to work more than 48 hr. or more than six days in any one week."

To this present Section 2, as above, is also now added: "On and after Nov. 1, 1933, as soon as the members of the code shall be operating at 60 per cent of capacity, they shall adjust the operations of their plants so that, except as to executives, those employed in supervisory capacities and in technical work and their respective staffs and those employed in emergency work, they will establish the 8-hr. day for all their employees."

in." But the prevailing view of most informed sources was that the Government would not have to write a steel code.

The steel code as finally signed by President Roosevelt, according to a press announcement of the National Recovery Administration, "contains several important changes in provisions governing maximum hours of work, administration and duration of the code. General Johnson had issued a brief summary of these changes at 1 A. M. last Saturday, and they were detailed after the code was signed late that night by President Roosevelt. Yet when analyzed it is not possible to find anything in the nature of sweeping changes from the form of the original code.

Wages were left unchanged in every respect with minimum rates per hour ranging from 25c. in the South to a top minimum of 40c. in seven Northern producing districts, with intervening rates of 27c., 30c., 35c., 37c. and 38c. The changes made provide for an average 40-hr. week over a period of three months with a maximum per employee of 48 hr. and six days per week, the fixing uniformly of an 8-hr. day "on and after Nov. 1, 1933, as soon as production reaches 60 per cent capacity," and a "truce" period of 90 days during which the National Recovery Administration officials will have access to records of the American Iron and Steel Institute to determine the effect of the code.

These National Recovery Administration officials consist of the National Administrator and "one or two other persons appointed by him (who shall be persons not having or representing interests antagonistic to the interests of the industry.") Significance is attached to the parenthetical qualification taken from the official announcement. It was interpreted as meaning plainly that organized labor or other representatives which the industry considers antagonistic to it shall not serve with the National Recovery Administration in inspecting reports of the steel industry to the American Iron and Steel Institute, the coordinating agency in operating the code.

Eight-Hour Day After Three Months

The plan for an average 40-hr. week accords with the institute's original code, except that it shortens the period to three months instead of six months. The maximum of 48 hr. and six days a week provided in the code as signed by the President is new material but does not differ greatly from present operations. The change proposing a uniform 8-hr. day for all departments is made conditional upon operations at the rate of 60 per cent of capacity on or after Nov. 1 of the present year. Under existing schedules, the 8-hr. day is observed generally, except in continuous process departments, and if the industry attains a rate of 60 per cent on the date specified more men necessarily would be added and the schedule shifts arranged largely along the line provided in the Government provision. In this connection it is reported that the Government already has under way plans for large-scale railroad buying and stepping up of the public works program in order to engage more workers in steel and other industries. This would naturally build up operating capacity.

Institute's Records Open to Government

INSPECTION by the Government of American Iron and Steel Institute records covering the code operations during the 90-day "truce" or "test" period undoubtedly could have been demanded by the Government under the Industry Recovery Act even though this provision had not been written into the code. Incidentally, it has been pointed out that the provision will allay labor agitation during the three-month period, something desired as much by the Government as by the steel industry itself.

In his summary of the agreement reached between the steel executives and the Government, National Recovery Administrator Johnson pointed out that a general increase of 15 per cent in wages had been made by the steel industry since July 1. He explained further that the minimum wages fixed in the code are estimated by steel companies to exceed 40c. per hour. This, it was stated, results from the fact that higher minimum wages than those fixed in the code are paid to large groups of common labor.

Called a "temporary" code, because of the 90-day provision made in order to determine its effect, it is made subject to approval, modification or cancellation by the President after that period. The right to terminate the code after 90 days also is given to the industry. This provision was carried in the original code and most of the matter carried in the revised code is taken verbatim from the code as sub-

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Original Article VI, relating to administration, now contains an added section, (Number 7), as follows:

"The members of the code recognize that questions of public interest are or may be involved in its administration. Accordingly, representatives of the Administration, consisting of the Administrator and one or two persons appointed by him (who shall be persons not having or representing interests antagonistic to the interests of members of the industry) shall be given full opportunity at such times as shall be reasonably convenient to discuss with the board of directors or any committees thereof any matters relating to the administration of the code, and to attend meetings of the board at which action on any such matters shall be undertaken and to make recommendations as to methods or measures of administering code.

"Due notice of all such meetings of the board of directors shall be given to such representatives of the Administration. The records of the board of directors relating in any way to the administration of the code shall be open to such representatives at all reasonable times. They shall be accorded by the board of directors complete access at all times to all records, statistical material or other information furnished or readily available to the board of directors in connection with, or for the purpose of, the administration of the code.

"The board of directors, acting directly or through one or more committees appointed by it, shall give due consideration to all requests, suggestions or recommendations made by such representatives of the Administration and render every possible assistance to such representatives in obtaining full information concerning the operation and administration of the code, to the end that the President may be fully advised regarding such operation and administration through reports that may be made to him from time to time by such representatives, and to the end that the President may be assured that the code and the administration thereof do not promote or permit monopolies or monopolistic practices, or eliminate or oppress small enterprises, or operate to discriminate against them and to provide adequate protection of consumers, competitors, employees and others concerned and that they are in furtherance of the National Industrial Recovery Act."

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mitted by the American Iron and Steel Institute. Also, the President's right to approve, modify or cancel the code is held to be nothing more than formal notice written into the steel code which is granted by the Recovery Act itself and applicable to all codes.

Administration Estimates 50,000 Added Workers

AFTER the code was signed by the President, officials estimated that it would mean an increase of 50,000 workmen in the steel industry. They did not indicate the basis of their calculation. At the same time they estimated increases in laborers growing out of the Government-written oil code, and the lumber code would be 240,000 and 115,000, respectively. All industries concerned were hopeful that events would justify the official optimism.

Speaking of the steel code, General Johnson said, "It contains something which is the most significant thing we have done down here." Apparently, General Johnson had in mind the proposal for a uniform 8-hr. day, for the hustling, 20-hr. day working Administrator, added:

"We have got the industry to go on an 8-hr. day and we think from our statistics that will be a 35-hr. week. It will be straight and permanent."

Moving swiftly from one code conference to another, General Johnson did not amplify this statement. Nevertheless, it was held to give a key to what went on behind closed doors as exhausted steel executives and Government officials sweltered at day-and-night conferences, shifting back and forth in the offices of Secretary of Labor Frances Perkins and in National Recovery Administration offices in the Department of Commerce building. During intervals steel executives were trying to rest at their rooms in the Shoreham Hotel as they anxiously awaited conclusions of the negotiations in order that they might return to their accumulating tasks in their home offices.

The matters of hours and wages were the chief and most important points discussed. Indirectly the open shop and the closed shop probably took a part in the conferences but officially this important issue was not on record since the open shop declaration was struck from the code. It was, however, made a part of the hearing, when President R. P. Lamont of the American Iron and Steel Institute, immediately subsequent to withdrawal of the declaration, stated that it is the purpose of the steel industry to adhere to the open shop principle.

Wages and hours carried in the institute code were evidently adopted because, as frankly conceded by Secretary Perkins, steel statisticians had submitted additional data on these questions which were not available to the Government. Miss Perkins had originally urged a 32-hr. week, it is stated, and had recommended that the number of wage areas be reduced to two or three, instead of the 21 set up in the code and left unchanged. The data of the steel officials, however, are said to have convinced Government representatives that the 32-hr. week is out of the question and apparently the 35-hr. week, mentioned by General Johnson, has simply been set up as a mark to shoot at without any indication of its early acceptance. For the steel industry stood steadfast, as it had given prior notice through Mr. Lamont that it would, to the hours and wages the institute had named. This was not in "defiance" of the Government, as over-dramatized statements from organized labor leaders and a section of the daily press said. It was recognition of realities, of the inability of the steel industry to go further.

Chairman E. T. Weir of the National Steel Corporation, smashed the "defiance" talk.

"We refused to meet with Mr. Green (president of the American Federation of Labor) yesterday," said Mr. Weir last Wednesday, "because we object to the methods now being followed by organized labor everywhere in seeking to build up membership before adoption of the code for the steel industry.

"We object to the effort being made to give the impression among our employees—not only in my own company but throughout the entire steel industry—that they must join labor unions.

"Had Mr. Green sat in the meeting with us yesterday the A. F. of L. organizers could have said, 'See, Mr. Green has been recognized by the steel industry.' They would have ignored the fact that Mr. Green was appearing as a Government official.

"It is unfortunate if the impression continues that the steel industry is trying to set itself up as bigger than the Government. This is not so."

MR. WEIR'S reference to Mr. Green related to the tiff that occurred on Tuesday of last week, the first day of the conference between steel executives and Government officials. Steel executives "walked out" on Mr. Green when he entered the office of Secretary Perkins where the conference was under way. General Johnson a few hours later said Mr. Green was not the labor adviser on the steel code, but that Miss Perkins had been selected to act in that capacity. Subsequently General Johnson's attention was directed to an announcement of July 31 by the National Recovery Administration that Mr. Green has been chosen as labor adviser on the steel code. There still seems to be confusion over the situation, however, for the steel executives negotiated with Miss Perkins and at no time were in conference with Mr. Green. Even in his corrected statement General Johnson said Miss Perkins had been named several days before Mr. Green was chosen by Chairman Wolman of the Labor Advisory Board.

Mr. Green at the steel code hearings asked for the standard organized labor 5-day week, 6-hr. day, with a rate of 60c. per hour. The proposal was not even mentioned at the conferences, it is said. Instead more moderate, yet broad changes suggested by Miss Perkins and other Government representatives were discussed, though held to be entirely impractical, under present conditions. It is reported that Miss Perkins and other Government officials urged hourly rates of pay ranging from 43c. or 45c. as the highest minimum. Some proposed a differential of 10c. in favor of the South, while others wanted it reduced or entirely eliminated.

While unverified, it is reported that feeling growing out of the Green incident the first day of the conference was responsible for the call the day following made upon President Roosevelt by Chairman Myron C. Taylor of the United States Steel Corpn., and Chairman Charles M. Schwab of the Bethlehem Steel Corpn.

Those who participated in the conference when agreement was reached on the code last Friday night included the following: General Johnson, Deputy Administrator Kenneth M. Simpson, General Counsel Donald Richberg of the National Recovery Administration; President William A. Irvin, United States Steel Corpn.; President Eugene G. Grace, Bethlehem Steel Co.; Chairman E. T. Weir, National Steel Corpn.; President Tom M. Girdler, Republic Steel Corpn.; President Hugh Morrow, Sloss-Sheffield Steel Co.; President L. E. Block, Inland Steel Co.; William J. Filbert, comptroller, and Nathan L. Miller, counsel, United States Steel Corpn., and H. A. Moore, counsel, American Iron and Steel Institute.

Metal-Working Groups Join Blue Eagle Ranks

FOLLOWING are some of the metal-working recruits to Blue Eagle ranks as announced this week by Administration authorities in Washington. These groups have signed the "certificate of compliance" and are conforming to the substituted provisions of the various codes submitted and under consideration.

Steel Warehouse Industry,
Gas Appliance Industry,
Cooking and Heating Appliance Industry,
Farm Equipment Industry,
Lead Industry,
Shovel, Dragline and Crane Industry,
Construction Industry,
Oil Burner Industry.

Fabricated Metal Products Federation Seeks Basic Code

WASHINGTON, Aug. 22.—The Fabricated Metal Products Federation has addressed a communication to some 6500 manufacturers and trade associations employing between 750,000 and 1,500,000 persons, urging the desirability of all elements in the industry agreeing upon a single basic code. The National Recovery Administration announced that representatives of approximately 100 organizations and companies conferred with Deputy Administrator H. O. King and it was decided that if each group or a large number of groups should insist upon having separate codes the purpose of the act, that of expediting employment and recovery, would be seriously delayed and much confusion would result.

The Board of Directors of the Federation includes:

Chairman, H. D. North, president, Ferry Cap & Set Screw Co.; secretary-treasurer, Harry S. Kimball, former president, Remington Arms Co.; R. E. Pritchard, vice-president, The Stanley Works; H. G. Donham, United Shoe Machinery Co.; W. M. Goss, secretary, The Scoville Mfg. Co.; Alexander Watson, Youngstown Pressed Steel Co.; Wm. D. Disston, Henry Disston & Sons; G. B. Durell, American Fork & Hoe Mfg. Co.; A. E. Payson, Insulated Container Association; A. M. Ferry, Wire Cloth Manufacturers Association; H. R. Naylor, vice-president, Pressed Metal Institute; A. E. Alverson, president, American Hardware Manufacturers Association; Arthur E. Swanson, Screw Machine Products Association; D. S. Hunter, trade executive; Irving S. Paull, Institute of Cooking & Heating Appliance Manufacturers, Inc.; Stuart J. Swenson, Aluminum Wares Association, and George P. Byrne, United States Machine Screw Service Bureau.

Boiler Manufacturers' Code Hearing Set for Aug. 31

WASHINGTON, Aug. 24.—Hearing on the code of fair competition submitted by the American Boiler Manufacturers' Association has been set by the National Recovery Administration for Aug. 31 before Deputy Administrator Malcolm Muir in the small ballroom of the Willard Hotel. The association represents 70 per cent of the industries it covers. The code provides for an hourly wage rate of 37c. per hour for employees engaged in the processing of any products in the boiler manufacturing and affiliated industries unless the rate on July 15, 1929, was less. In the event the rate on that date was below 37c., the rate shall not be less than 30c. Casual and incidental labor may be paid not less than 80 per cent of the minimum. The total amount paid to labor in this class shall not exceed in any calendar month 5 per cent of the total wages paid to all process labor. The code does not carry sectional differential wage rates.

The code sets up a committee of Industrial Recovery of the A. B. M. A. as the coordinating agency. Provision is made that within 90 days after the effective date of the code the committee shall report to the Industry Recovery Administrator the action taken by all employers in adjusting hourly rates of wages over the minimum.

The maximum work week is 40-hr. for employees engaged in processing products of the industries with exceptions to cover branches during the seasonal or peak demands. A system of standard accounting provided by the Machinery Builders' Society is proposed as a means of arriving at costs. Selling below cost of production is made a violation. Numerous other unfair practices are listed.

Virginia Bridge & Iron Gets Panama Contract

WASHINGTON, Aug. 22.—The Virginia Bridge & Iron Co. has been awarded a contract by the Panama Canal for drum gates for Madden dam. They involve approximately 1200 tons of heavy plates.

Committee to Study Condition Under Code

WASHINGTON, Aug. 22.—Secretary of Labor Frances Perkins today announced that she is preparing to set up a Labor Committee to observe the operations of labor conditions under the steel code. General Hugh S. Johnson said at a press conference late today that Miss Perkins had not consulted him regarding the setting up of the labor committee but explained that it might well tie in with the work of the National Recovery Administration with regard to the code.

General Johnson also said he is preparing to issue a statement soon to clarify confusion over the open and closed shop question. He proposes to give his interpretation of the labor provisions of the National Recovery Act and it may be included in the codes.

Refractories' Industry Gets 40-Hr. Week

WASHINGTON, Aug. 22.—Modification of the President's Reemployment Agreement covering the refractories' industry has been approved by General Hugh S. Johnson, National Recovery Administrator. The modification provides a maximum week of 40 hours for factory and mechanical workers averaged over a two-month period, but not to exceed 48 hours in any week or 8 hours in any day. With the same limitations the hours of employees engaged in continuous burning and drying processes are to be averaged over a 90-day period. The minumum hourly wage rate is graduated from 40c. an hour in District No. 2, including Pittsburgh and Salina, Pa., and Niles, Ohio, down to 25c. in Alabama, Georgia and also in Texas, with 35c. paid in most districts. This is a guaranteed minimum regardless of time or piece-work performance. It is also provided that any rates below 32c. an hour may be raised if the code of the steel industry provides higher rates for corresponding territory.

Sharp Jump in July Iron and Steel Imports

WASHINGTON, Aug. 22.—Making a gain of 18,437 gross tons, imports of iron and steel in July aggregated 52,805 tons compared with 34,368 tons in June. Pig iron imports in July rose to 18,339 tons, an increase of 7109 tons, and scrap imports totaling 13,391 tons reflected an increase of 9333 tons.

Of the July pig iron imports, 13,471 tons came from the Netherlands and 3931 tons from India. All of the incoming shipments came from Canada as did the 2581 tons of rails received in July. Canada was easily the leading source of imports, supplying 20,648 tons.

Ferromanganese and spiegeleisen imports were 7252 tons, of which 4422 tons came from Canada and 2551 tons from Norway. Sweden supplied 952

tons and Germany 570 tons of the 1753 tons of wire rods imported. Imports of structural shapes totaled 2306 tons, of which 1083 came from Belgium; 753 tons from Germany and 462 tons from France.

Farm Implement Code Hearing Sept. 1.

WASHINGTON, Aug. 22.—Deputy Administrator Malcolm Muir will preside at a hearing on a code of fair competition for the agricultural implement industry to be held Sept. 1 in the large ballroom of the Willard Hotel. A maximum work week of 40 hours is provided for factory employees, averaged on a yearly basis of 52 weeks, no employee to be worked more than 8 hours in any one day. A tolerance of 10 per cent is permitted in the case of employees engaged in preparation, care and maintenance of plant machinery and production facilities. In cities of more than 1,000,000 population, together with all industrial communities in the same immediate manufacturing area, the minimum wage to be paid factory workers is 40c. an hour; in the Southern States, 30c. an hour and in other territory, 35c. an hour. These minimum rates apply on piece work as well as work on a time basis. The code carries an open shop provision.

July Tool Sales Best In Past Eighteen Months

THE index for orders of machine tools for July, as computed by the National Machine Tool Builders Association, was 58.5. This is the highest monthly index figure for the past 18 months and compares with 40.3 for June.

According to the association, the upswing in the industry is definitely on its way. Orders are increasing, inquiries are easier to close, shipments are stepping up and backlogs are accumulating.

The Cincinnati machine tool market, during the past fortnight, has shown increased activity. Several factories have enlarged their working forces to handle the improved demand. Light machinery, such as lathes, drillers, millers and grinders are particularly responsive.

Machine tools are moving at a well sustained pace to the New York metropolitan and North Atlantic industrial sections. No recession is reported of the improved demand which appeared early in June, and sellers are greatly heartened by the absence of the usual July and August decline. Small tools, precision lathes and gages are being sold in better volume than for any period during the past two years.

Individual Bargaining Asked In Copper Industry Code

WASHINGTON, Aug. 22.—The copper industry code filed with the National Recovery Administration provides that the individual employee shall have "the right to bargain individually for the terms and conditions of his employment."

The provision is said to be the first of the kind incorporated in any of the many codes filed. It is considered significant. Reports have been current of late that the counsel in the Recovery Administration has misgivings as to the soundness of the labor provision of the act giving employees the right to bargain collectively through employees of their own choosing. The point has been raised that this provision would deny to the individual employee the right to bargain with his employer. It is reported that the Administration may make a statement on the subject soon, though the report has not been verified making it clear the law providing for collective bargaining shall not be construed as preventing individual bargaining. This would not set well with organized labor, it is stated, and for this reason the question has not been given an airing, but nevertheless is receiving wider discussion. The copper code promises to develop the issue and perhaps bring it to a head.

The copper code, after carrying the usual labor provisions of the law itself, adds: "It is understood that satisfactory existing relationships between employees and employers shall be permitted to continue; nothing herein contained shall be considered as denying to the individual employee the right to bargain individually for the terms and conditions of his employment."

It is further explained that "the operation of concentration mills, smelters and refineries is continuous throughout 24 hr. per day and seven days per week, and daily work is divided into three shifts of 8 hr. each. The operation of underground mines, as a matter of safety for the men, requires the miners on each working face to have a continuing detailed knowledge of the conditions of ground and timbering. In mines the day work is divided into two shifts for blasting and reconditioning of air and the time involved in change of shifts, as well as special conditions in mining, make impracticable a decrease in the length of each shift or an increase in daily shifts."

With this explanation the maximum work week is fixed at 40 hr., of 8 hr. a day, averaged over a period of three months.

The minimum wage for unskilled labor is fixed at 35c. an hour, except for Arizona and New Mexico where it is to be 30c. an hour, with a proviso affecting persons on a semi-pension basis who are to be paid not less than 80 per cent of the minimum wage above referred to, and that the total number of such persons shall not exceed 5 per cent of the total day wage employees in the plant in which they are employed.

Persons under 16 years of age are not to be employed. Office and salaried employees are to have a 40-hr. week averaged over 6 months, and the minimum wage is fixed at $15 per week.

The executive committee established under the code is empowered to fix the percentage of production of each of three classes of producers whose present production capacity is set forth as follows:

	Tons per Annum
Class A Producers:	
Kennecott group	336,500
Anaconda group	226,000
Phelps Dodge Corpn.	168,000
United Verde Copper Co.	68,000
Class B Producers:	
Calumet & Hecla	45,000
Miami Copper Co.	36,000
Class C Producers:	
Magma Copper Co.	25,000
United Verde Ext. Mining Co.	24,000
Consolidated Coppermines Co.	21,000
Copper Range Co.	15,000

During the existence of the code the percentage of production, that is production quota, shall, with certain exceptions noted, not exceed 20 per cent for any class A producer, 25 per cent for any class B producer and 30 per cent for any class C producer. By an affirmative vote of 65 per cent of the tonnage of the productive capacity of the signatories the executive committee may decide to increase production, the conditions for which are stipulated.

The executive committee is also empowered to fix the productive capacity of the companies not listed in its code.

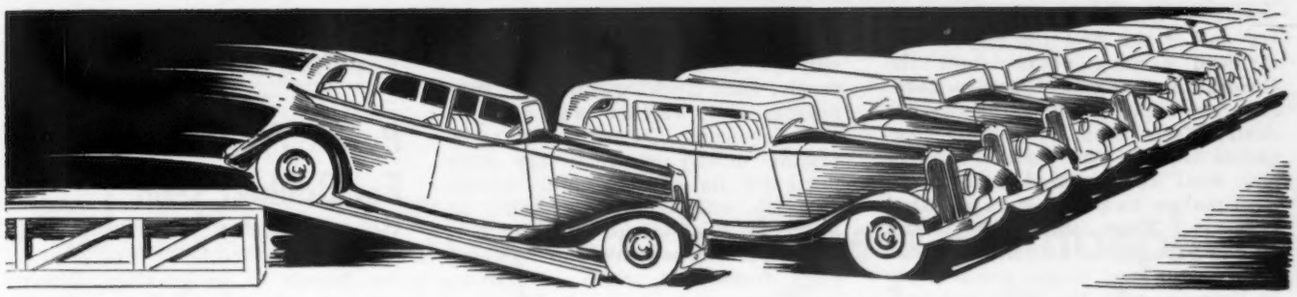
The NRA is hopeful that before this code comes up for hearing, the negotiations to bring in the customs smelters and resmelters under the same code will be successful.

Coming Meetings

August-September

Society of Automotive Engineers. Aug. 28 to Sept. 4. International automotive engineering congress, Palmer House, Chicago. John A. C. Warner, 29 West Thirty-ninth Street, New York, general manager.

Electrochemical Society. Sept. 7 to 15. Fall meeting, Stevens Hotel, Chicago. Colin G. Fink Columbia University, New York, secretary.



▲▲▲ THIS WEEK ON THE ASSEMBLY LINE ▲▲▲

Change-Overs Postponed As Sales Rebound

DETROIT, Aug. 22.

FOLLOWING a short period of declining business, retail automobile sales have rebounded with a liveliness which has surprised motor car manufacturers themselves as well as their suppliers. The recovery in demand has brought to steel mills the past week unexpected fill-in orders of considerable volume from leading automobile companies. It also has resulted in an upward readjustment of current production schedules and in postponement of change-overs to new models.

It is understood that Chevrolet's retail deliveries in the first 10 days of August exceeded those in the same period of July and total deliveries for the month are likely to equal or be close to those of last month. Chevrolet has added 5000 units to its August program, which now calls for more than 70,000 units. That the retail automobile market is displaying amazing vitality in the face of seasonal handicaps is proved by the fact that in August Chevrolet will turn out more cars than in its biggest month of 1932.

Pontiac's assemblies this month will be at least 8000 units, while Buick and Oldsmobile each will make 4500 cars. This, plus Cadillac-La-Salle operations, will give General Motors a total production in August of at least 87,000 units. Chrysler is doing well and Plymouth's activities are said to have been stepped up somewhat to keep pace with retail sales. Chrysler Corpn. is counting on about 45,000 assemblies for the present month. Ford will build 57,000 cars in August and tentatively has set the same figure for September. Hudson and Studebaker are doing much better and have relatively satisfactory schedules for this month. With the industry maintaining its present pace, output in August will easily cross the 200,000 mark.

September Prospects Not Clear

What September holds for the industry no one is yet prepared to say. Since the life of old models is nearing its end, factories are ultra-conservative in scheduling production, yet companies wish to take advantage of the present buying mood of the public and make as sizable profits as possible from this year's lines. For this reason discussion of next year's cars is much less than usual. Moreover, purchases of necessary equipment for tooling up have been delayed longer than normal not only because of the prolonged production runs on current models, but also because of uncertainties regarding costs until the automobile code is approved. Realizing that they will not have much time to make changes this fall, production executives are perfecting plans to do the tooling up work with the least confusion and the greatest dispatch. New cars will not be introduced much before the year-end. Chevrolet probably will carry current operations along through the entire month of October, whereas last year it made only about 3000 units, mostly commercial cars, during that month. Chevrolet and Buick are the only two companies which have let out any important die work for 1934 cars, although others will follow soon. The placing of orders for steel for experimental purposes is one of the few surface indications that preparations are being made for 1934.

Automobile companies are in a mood to resist many of the provisions of the steel code and, in fact, already are said to have made representations to the Administration at Washington against acceptance of the code as it stands. The first pill which they find hard to swallow is the stipulation of a single price for all consumers, large or small. They assert that their tonnage entitles them to preferential treatment and they resent having to pay the same price as the small shop. They are opposed to the abolition of the Detroit base on steel bars. They are reported to want Detroit made a basing point not only on bars, but also on strip steel, sheets and other products going into the manufacture of automobiles. They likewise are dissatisfied with the basing points for pig iron. General Motors' foundries, for example, are mainly located outside Detroit, so that a Detroit, Cleveland or Buffalo base is not considered sufficiently advantageous. General Motors naturally would like a basing arrangement which would give its foundries at Saginaw, Flint and other cities pig iron at a low delivered price. Then the automobile people wish to continue the policy of bulk buying. That is, they think that they should get a preferential price on an order of 10,000 tons of sheets because of the quantity involved, even though this tonnage might be broken up into a hundred different items. Furthermore, they are seeking guarantees that price advances will not be applied to material for current models. The fight against the steel code, it is understood, is being waged privately and with great vigor. The steel trade, supporting the provisions of the code eliminating some of the unhealthy price practices which have long existed, point out that the large automobile companies should be gratified to know that under the code no buyer will have an advantage over any other buyer and that so long as these companies are able to purchase steel at as low a price as any other user, they should not object to changes in selling practice which enable the steel industry to earn a fair return on its in-

vestment. With the automobile industry one of the first to recover its dividend earning power (note the General Motors and Chrysler earnings for second quarter), the steel industry feels that automobile companies are in a poor position to criticize steel code provisions enabling steel makers to help restore vanished earnings. These obstructive tactics on the part of the automobile industry, say the steel people, are scarcely in harmony with the spirit and purpose of the NRA program.

Detroit Notes

Ford is running its 10-in. merchant bar mill, using billets which have long been in stock at the Rouge plant. After the stock, estimated at 20,000 tons, is exhausted, it is believed that Ford will not attempt further to operate the mill. . . Chrysler Corpn. has asked its vendors to fill out a long questionnaire answering questions pertaining to intimate details of their business, such as wage rates, hours worked by employees, the amount of laboratory equipment in their possession, modes of transportation for hauling their products to customers' plants, labor supply in their community, labor troubles and, significantly, what trucking equipment they possess and whether any of it is Chrysler-made. . . Ford is said to be placing quietly contracts for some parts for its small V-eight (model 44), job, although it is showing no hurry in going ahead with the car. . . . Experiments with a fluid flywheel, chief feature of which is extreme smoothness of engagement with elimination of all wearing surfaces, are reported being conducted by the Eaton Mfg. Co. in the local laboratories of its Wilcox-Rich division. . . Pontiac's 1933 sales through Aug. 10 exceeded the same period of 1932 by 23,018 units. . . In the first seven months of this year Chevrolet made retail deliveries of 372,772 cars, compared with 279,772 in the same period of last year. . . Motor car makers belonging to the National Automobile Chamber of Commerce have added 37,000 men since April 1, an increase of 40 per cent in the total number employed. . . To economize automobile manufacturers will rebuild a considerable number of their machine tools instead of buying new tools in preparing for 1934 production.

Power Apparatus Bids For Boulder Dam

WASHINGTON, Aug. 22.—Awards will be announced here soon by the Bureau of Reclamation, Department of Interior, for four 1,000,000-lb. and one 500,000-lb. generators for Boulder Dam. Bids, f.o.b. place of production, were opened last Friday at the bureau's office in Denver, and were announced as follows by R. F. Walter, chief engineer:

Two 1,000,000-lb. units for early delivery—General Electric Co., Schenectady, $1,240,000; Allis-Chalmers, Milwaukee, $1,270,000, and Westinghouse, Pittsburgh, $1,285,000. Two similar units for later delivery—Westinghouse, $1,285,000; General Electric, $1,327,000; Allis-Chalmers, $1,340,000.

One half-size unit—Allis-Chalmers, $229,850; Westinghouse, $241,000 and General Electric, $245,000.

Changes in Original Steel Code Schedules

IN addition to the changes in the code itself, set forth on the preceding pages, the following changes were made in the original schedules which accompanied the code:

Schedule E—Section 6 includes this added provision: "The Board of Directors by the affirmative vote of a majority of the whole board may establish maximum rates of discount and maximum periods of free credit, other than those specified in Schedule G of the Code, which may be allowed by any member of the Code with respect to the sale of any product or products to jobbers for resale as permitted by the provisions of Section 4 of this Schedule E. The Secretary shall give notice in writing of any action taken by the Board of Directors in accordance with the provisions of this Section 6 to each member of the Code, which at the time shall be engaged in producing the kind of product in the sale of which any such other rates or periods shall have been established by such action."

In Section 7 of Schedule E, which relates to extras and deductions to or from base prices, the following provision is made: "Lists showing such rates shall be filed with the Secretary and shall be open to inspection at all reasonable times by anyone."

A new Section, No. 13, has been added to Schedule E and reads as follows: "If and to the extent requested by the Administrator, all decisions of, permissions and approvals given by and rules and regulations made by the Board of Directors, pursuant to any provision of this Schedule E, shall be reported to him."

Changes in the list of basing points in Schedule F are as follows:

Pittsburgh, Chicago and Birmingham are made basing points for rolled or forged axles.

Alloy steel ingots, blooms, billets and slabs are given the following basing points: Pittsburgh, Buffalo, Chicago, Canton, Ohio, Massillon, Ohio, and Bethlehem, Pa.

In addition to San Pedro, San Francisco, Portland and Seattle, which were originally named as Pacific Coast ports, Wilmington, Cal.; Oakland, Cal., and Tacoma, Wash., are added as basing points for bale ties, concrete reinforcing bars, merchant steel bars, plates, railroad tie plates, sheets, sheet steel piling, structural shapes, wire, wire nails, staples, barbed wire, and wire fencing.

Low phosphorus pig iron is given the following basing points: Birdsboro, Pa., Steelton, Pa., Standish, N. Y., and Johnson City, Tenn.

Minnequa, Col., is substituted for Pueblo as the basing point for railroad tie plates and for railroad track spikes.

Pittsburgh is named as the basing point for boiler tubes.

Pittsburgh and Chicago are named as basing points for rolled steel car wheels.

Waukegan, Ill., replaces Chicago as a basing point for telephone wire and the Pacific Coast ports are struck out.

Angle bars and rail joints are placed with rails of 60 lb. or heavier on an F. O. B. mill basis. In the original schedule, they were based on Pittsburgh, Buffalo, Chicago, Birmingham, Steelton and Pueblo.

Adoption of Steel Code Clears Atmosphere as Output Undergoes a Further Decline

Recession of Production to 50 Per Cent of Capacity Reflects Recent Uncertainty—Codification Stimulates Anticipatory Buying

MILL bookings continue to lag and production has receded further, but the final adoption of the steel code has cleared the atmosphere of many of the doubts and fears that had been accumulating in recent weeks. The fact that the code, although put into effect only for a 90-day trial period, departs only in minor particulars from the original draft submitted by the industry reflects a spirit of conciliation and understanding at Washington that augurs well for successful administration of the code's provisions. No less important is the strong impetus that steel codification has given to the whole NRA program, particularly the work of codifying other branches of the metal-working industry.

Lingering doubts among buyers concerning the trend of prices have now been set at rest. While it is by no means certain that quotations for fourth quarter will be advanced on all products, stabilization of present market levels seems assured, since concessions from published prices are now outlawed. Already there are evidences of anticipatory buying, as consumers hasten to take advantage of preferential quotations that are still outstanding.

MEANWHILE steel production has fallen three points from 53 to 50 per cent of capacity. The Pittsburgh rate has declined from 45 to 40 per cent, the Cleveland-Lorain rate from 65 to 63 per cent, the Valley average from 60 to 55 per cent, the Buffalo rate from 51 to 43 per cent, and the eastern Pennsylvania level from 45 to 44 per cent.

Steel bookings from the automobile industry reflect the changing moods of the general public. An unlooked for rebound in retail sales of cars has brought steel mills unexpected fill-in orders during the past week, at the same time causing automobile makers to postpone change-overs to new models.

AUTOMOBILE companies are strongly opposed to the single-price provision of the steel code, and for a time may offer resistance to the code quotations.

This complication, however, is less serious from the standpoint of steel producers than the necessity of filing prices before a coal code is adopted. While, for the time being, the fuel market is easier on the surface, underneath remains a degree of labor unsettlement which may not subside even with codification.

RAILROAD buying, which has been long dormant, may be given a sharp stimulus this fall by R.F.C. loans. Bids on 59,000 tons of steel for the Grand Coulee Dam in the Columbia River basin will be taken about Jan. 1.

Better steel demand from agricultural areas is expected despite smaller grain crops. Higher prices, it is estimated, will bring the farmer $750,000,000 more than he received in 1932. In addition, he will get a substantial bonus for curtailing his plantings.

Scrap markets continue to have a weak tone and heavy melting steel has declined at Pittsburgh, driving down THE IRON AGE scrap composite from $12.08 to $12 a ton.

CHANGES in the steel code are not of major importance. The board of directors of the American Iron and Steel Institute, through a majority vote, is permitted to establish maximum rates of discount and periods of free credit other than those specified in the code.

New basing points have been added as follows: Pittsburgh, Chicago and Birmingham for axles; Pittsburgh, Buffalo, Chicago, Bethlehem, Pa., and Canton and Massillon, Ohio, for alloy steel ingots, blooms, billets and slabs; Pittsburgh for boiler tubes; Pittsburgh and Chicago for rolled steel car wheels; Birdsboro and Steelton, Pa., Standish, N. Y., and Johnson City, Tenn., for low phosphorus pig iron. Angle bars and rail joints are placed with 60-lb. and heavier steel rails on an f.o.b. mill base.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Aug. 22, 1933	Aug. 15, 1933	July 25, 1933	Aug. 23, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	$17.34	$17.34	$17.34	$13.84
No. 2, Valley furnace	16.50	16.50	16.50	14.50
No. 2 Southern, Cin'ti	17.73	17.73	17.61	13.82
No. 2, Birmingham	13.00	13.00	13.00	11.00
No. 2 foundry, Chicago*	17.00	17.00	17.00	15.50
Basic, del'd eastern Pa.	17.09	17.09	17.09	14.00
Basic, Valley furnace	16.00	16.00	16.00	13.50
Valley Bessemer, del'd P'gh.	18.89	18.89	18.89	16.89
Malleable, Chicago*	17.00	17.00	17.00	15.50
Malleable, Valley	16.50	16.50	16.50	14.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	$82.00	$82.00	$82.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.598	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh	1.65	1.65	1.60	1.45
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.00

Finished Steel

	Aug. 22, 1933	Aug. 15, 1933	July 25, 1933	Aug. 23, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.25	2.10
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.20
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.75
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	2.85
Hot-rolled sheets, No. 10, P'gh	1.65	1.65	1.65	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.75	1.75	1.75	1.65
Wire nails, Pittsburgh	2.10	2.10	2.10	1.95
Wire nails, Chicago dist. mill	2.15	2.15	2.15	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh	2.60	2.60	2.60	2.60
Barbed wire, galv., Chicago dist mill	2.65	2.65	2.65	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.75	$14.00	$13.75	$8.75
Heavy melting steel, Phila	12.00	12.00	11.75	6.50
Heavy melting steel, Ch'go	10.25	10.25	10.75	5.75
Carwheels, Chicago	10.50	10.50	10.50	7.00
Carwheels, Philadelphia	12.75	12.75	12.75	8.50
No. 1 cast, Pittsburgh	11.75	11.75	11.75	9.50
No. 1 cast, Philadelphia	12.50	12.50	12.50	8.50
No. 1 cast, Ch'go (net ton)	10.50	10.50	10.50	6.25
No. 1 RR. wrot., Phila	12.00	12.00	12.00	8.50
No. 1 RR. wrot., Ch'go (net)	9.00	9.00	9.00	3.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$2.50	$2.50	$2.50	$2.00
Foundry coke, prompt	3.25	2.75	3.00	2.75

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	8.75	8.75	8.75	5.12½
Lake copper, New York	9.00	9.00	9.00	5.50
Tin (Straits), New York	44.12½	43.75	46.87½	23.12½
Zinc, East St. Louis	4.85	5.00	5.00	2.75
Zinc, New York	5.22	5.37	5.37	3.12
Lead, St. Louis	4.35	4.35	4.35	3.25
Lead, New York	4.50	4.50	4.50	3.40
Antimony (Asiatic), N. Y.	6.87½	7.00	7.50	5.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Aug. 22, 1933	1.979c. a Lb.	$15.94 a Gross Ton	$12.00 a Gross Ton
One week ago	1.979c.	15.94	12.08
One month ago	1.973c.	15.90	12.08
One year ago	1.964c.	13.64	7.00
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1933	1.979c., Aug. 8	1.867c., Apr. 18	$15.94, Aug. 1	$13.56; Jan. 3	$12.25, Aug. 8	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.037c., Jan. 14	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25; Jan. 11	13.08, Nov. '22

Steel Demand and Output Lower in Pittsburgh Area

Production Also Falls Five Points In Valleys As Mill Backlogs Decline and Consumers Await Code Results Before Further Buying

PITTSBURGH, Aug. 22.—Specifications for most finished steel products continue to decrease. Conrent demand is adversely affected by seasonal influences and also by the general policy of consumers to await establishment of new prices now being filed under the iron and steel code before entering further commitments. The present hesitancy is expected to continue until new prices are announced.

The prospective quotational set-up will likely reflect generally higher levels in view of increased operating costs resulting from code provisions. The prices being filed under the code are expected to be applicable to fourth quarter business, and, in the event of heavy covering by consumers prior to establishment of these prices, current quotations will be subjected to their first definite test. Some anticipatory buying has already appeared.

Orders for full-finished sheets in the past week were in the largest volume since the last week in June. Continued heavy demand for tin plate, despite unfavorable crop reports from several drought-stricken districts, suggests stocking by can makers in anticipation of a sharp mark-up in next year's tin plate prices. Sheet mill operations, despite the recent pick-up in orders, have fallen off slightly to 55 per cent of capacity. Tin mills are still operating at about 95 per cent. Demand for bars, plates and shapes continues quiet. Some early improvement in calls for the heavy products is in prospect. Recent release of $65,000,000 of Federal funds for public works projects may bring some tonnage to local mills this fall. Railroads continue to defer purchases. Some buying by the carriers is likely to occur in the fall, but replacement programs rely chiefly on the prospective loan policy of the Reconstruction Finance Corpn.

Lacking support of backlogs in the heavy hot-rolled products, steel ingot output in the Pittsburgh district this week will average 40 per cent, a drop of five points since last week. Steel production in the Valley and nearby northern Ohio mills is also lower at 55 per cent. Wheeling district operations are unchanged at 80 per cent.

The scrap market reflects softness, with No. 1 heavy melting steel slightly lower at $13.50 to $14. Pig iron and coke are extremely quiet.

Pig Iron

Shipments of basic iron to non-integrated steel makers have not slackened perceptibly. Movement to the merchant trade, however, is sluggish. Although higher wage rates and fuel costs presage increased quotations on pig iron for fourth quarter, the market is bare of forward interest. Some large-lot buying of basic for fourth quarter is in early prospect, but specific inquiry for such delivery has not yet appeared. Foundries in this district are amply covered through the third quarter, and little demand from that source is expected until present contracts near completion. Although the uncertainty of fuel supplies has been cleared up by settlement of the coal strike, pig iron prices continue strong.

Semi-Finished Steel

Demand for sheet bars from tinplate makers is well maintained, but movement of semi-finished steel to other consuming lines has declined. Although the slackening is largely a natural outcome of reduced mill schedules, it is also attributable to some liquidation of semi-finished steel stocks which several non-integrated mills had accumulated at lower prices early in the quarter. Billets, slabs and sheet bars are quotably firm at $26, Pittsburgh or Youngstown. Forging billets are steady at $31, Pittsburgh, as are wire rods at $35, Pittsburgh or Cleveland.

Rails and Track Accessories

With railroads still deferring important purchases, this market continues to be apathetic. A southern road is inquiring for about 50 tons of spikes. Other interest is limited to even smaller items. The local rail mill, which has already rolled some of the accessories included in the 38,000-ton rail and accessories order for export to Brazil, has not yet scheduled rolling of the bulk of this tonnage. Although significant buying by the carriers is considered likely this fall, purchasing programs will probably hinge largely upon the Reconstruction Finance Corpn.'s loan policy. Little business has been transacted at the prices established for delivery through Sept. 15, but quotations are nominally strong.

Bars, Plates and Shapes

Continued absence of support from the railroads and the lag in releasing Federal road and construction projects are restricting movement of heavy hot-rolled products. Plates for brewery work are fairly well sustained, but tonnage requirements from that source are not sufficient to provide makers with backlogs. Tank work for the oil industry has been deterred by codification complications, although completion of the oil code is expected to release some work in the near future. Barge construction is hampered by the uncertainty of Government appropriations for waterways improvements. The only recent order covers four barges, requiring 800 tons of plates, which will be constructed by the Dravo Contracting Co. for the Union Barge Lines. Structural steel makers still pin their immediate hopes upon Federal appropriations for public works projects. Release of $65,000,000 for completing the Tri-Boro Bridge at New York and erecting a number of public buildings may provide local mills with some tonnage. Structural inquiries in the past week improved, although major tonnage requirements were lacking. Lettings during the week were extremely light. Reinforcing bars are still dull.

Bars, plates and shapes are uniformly steady at 1.60c., Pittsburgh. Forging bars are now subject to an extra on all sizes of $5 a ton over the base price. Heretofore the $5 extra applied only to the larger sizes, while intermediate sizes took an extra of $3 a ton, with smaller sizes quoted at the base price. Alloy steel bars are firm at 2.45c. or 2.65c., base. The 1.75c. distributers price on reinforcing steel bars in cut lengths is well held, and rail steel is firm at 1.50c., Pittsburgh.

Wire Products

Demand from the jobbing trade is in fair volume, but specifications from the automotive industry have tapered off. Wire mills are cleaning up old orders, and current operating schedules are off slightly. Prices are apparently maintained, with bright hard wire unchanged at 2.10c., and spring wire at 3.10c., Pittsburgh and Cleveland. Wire nails for delivery to jobbers are firm at $2.10 a keg. A maker of cut nails has advanced the price on straight carload lots to $2.75, Pittsburgh, with a 10 per cent discount on size extras. Less carloads are quoted at $3, and lots of less than five kegs at $3.15, both without discounts on size extras.

Tubular Goods

A slight improvement in calls for boiler tubes and mechanical tubing was experienced in the past week. Standard butt-weld pipe continues to be quiet. Oil country goods, while dull at the moment, may soon enjoy

a pick-up when drilling programs are realined under the oil industry code. No fresh line pipe projects are reported.

Cold-Finished Steel Bars

New orders are becoming infrequent, and specifications against old contracts have diminished. Demand has contracted, particularly from the automotive industry. Warehouses, however, are taking fair quantities. The bulk of current shipments is being made against low-price contracts. What little new business is being placed is taking the full price of 1.95c., Pittsburgh.

Sheets

Specifications for full-finished sheets in the past week were the largest since the last week in June. Requirements of an automobile manufacturer who is engaged on a new model accounted for a good share of the orders, while a slight improvement was noticeable in demand from radio makers. Galvanized sheets have been enlivened by an inquiry from the Argentine Government, which has asked for bids Aug. 24 on 39,000 tons to be used as locust barriers. The inquiry has been broadcast to 28 countries, and, in view of its rigid specifications and delivery requirements, not more than 10,000 tons of the order is expected to be taken by American mills. Calls for common black sheets are infrequent. Barrel makers covered fully on that grade early in the quarter and are not expected to reenter the market for some months. The brewing trade continues to be an important factor in hot-rolled and annealed. Despite the spurt in specifications last week, sheet mills have continued to gain on backlog orders, and operations are scheduled at about 55 per cent of capacity. New sheet prices will soon be filed under the steel code, and announcement of fourth quarter prices, which are expected to be at higher levels, will undoubtedly drive in heavy specifications prior to the close of the third quarter. Current quotations are generally firm, with the exception of auto body sheets, which are still available at 2.30c. despite the fact that the asking price is 2.60c.

Tin Plate

Specifications continue heavy, with can makers still insistent in demand for deliveries. Unfavorable crop reports from certain drought-stricken areas has failed to retard takings of tin plate. Some stocking by can manufacturers, in anticipation of higher tin plate quotations for 1934, is accounting partly for current demand. Although interest in next year's requirements has already appeared, tin mills are definitely unwilling to consider forward shipments; in fact, sellers have discouraged additional business for this year in view of their heavy commitments which will engage operations at practical capacity well into the fall. All makers continue to operate mills at 16 turns, and the tin plate industry is still occupied at about 95 per cent of capacity.

Strip Steel

With fresh orders in reduced volume, back-logs are being cleaned up, and mills have lowered their operating rate further. Specifications from the automotive industry continue to dwindle. Inquiry from radio makers is picking up, but only mild support is expected from that quarter until next month, when seasonal activity gets under way. A few scattered orders for cold-rolled have been placed at 2.25c., Pittsburgh, and occasional bookings of hot-rolled have been made at 1.65c. Cooperage stock, though quiet, is firm at 1.75c., Pittsburgh.

Coke and Coal

Demand is virtually dormant. With strike contingencies out of the way, coke is plentiful. Furnace coke is available at $2.50 to $2.75, Connellsville, while standard brands of foundry coke are posted at $3.25, Connellsville. Premium brands of foundry coke, however, are nominally held at $'.50. Bituminous coal prices continue to reflect softness. Western Pennsylvania mine-run steam coal is quotably lower at $1.50 to $2, mines, while mine-run coking coal from the same region is available at $1.75 to $2.25. Many large consumers, who covered heavily in outside producing districts during the strike, have requested deferment of shipments because of inadequate handling facilities.

Scrap

Further recession in steel mill operations has brought a pause in scrap trading. Prices have consequently softened. No. 1 heavy melting steel is now quotable at $13.50 to $14, but, in the absence of sales, quotations are nominal. Consumers' stocks are considered ample enough to carry present operations through the month. Although some tentative interest is being shown in forward scrap, consumers have not indicated willingness to buy at present prices. Brokers, on the other hand, find little inducement to press sales. No. 2 railroad wrought and scrap rails have weakened in sympathy with No. 1 steel and are posted at $13.50 to $14. A scarcity of offerings is maintaining firmness in quotations on specialties. Low phosphorus billet crops are unchanged at $17 to $17.50.

Steel Scrap Advances Further at St. Louis

ST. LOUIS, Aug. 22.—Shipments of pig iron against contracts continue heavy, but there is no new buying except for fill-in purposes, and none is expected until after Sept. 1, when order books will be open for fourth quarter business. The melt of foundry grades is increasing, but the melt of basic iron is retarded by the abnormal use of scrap in open-hearth furnaces.

Steel

Business with the small structural fabricating shops has shown quite a pick-up in recent weeks, and some plants are reopening after having been closed for several years. Anheuser-Busch is contemplating building additional tanks, which will require from 100 to 400 tons of plates, depending upon the number ordered. Other brewery projects that are being considered await proper financing. The Missouri State Highway Commission will open bids Aug. 25 for projects requiring 118 tons of structural steel, 150 tons of reinforcing bars and 300 tons of wire mesh. The American Steel Foundries has awarded 150 tons of structural steel for improvements to Missouri Bridge & Iron Co.

Scrap

An East Side melter has bought about 5000 tons of No. 1 and No. 2 heavy melting steel. Expecting higher prices in September, dealers are said to be disinclined to sell. No. 1 heavy melting steel and No. 2 railroad wrought are 25c. a ton higher.

Pig Iron Quiet, Scrap Easier at Boston

BOSTON, Aug. 22.—With furnaces withholding fourth quarter quotations on pig iron, going business is confined to scattered small tonnages. It is believed that the largest consumers are well covered into the fourth quarter. but that the smaller foundries will require iron in that period. Sellers of domestic and Indian irons are adhering to code prices.

Scrap business has come virtually to a standstill, with No. 1 heavy melting steel about 25c. a ton lower. Local brokers have withdrawn all quotations, owing to weakness in the Pittsburgh district and to the holding up of shipments to eastern Pennsylvania consumers. Although the average New England metal-working plant is more active than it was a year ago, it is inclined to go slow until it is evident how codification will work out. As a result, scrap is accumulating rather slowly at these plants, and the supply of No. 1 heavy melting steel, No. 2 steel, breakable cast and similar scraps is in comparatively few hands.

New England rerolling mills, according to report, are not operating at more than 25 per cent of capacity. Fabricating companies have no more than a month's work ahead of them.

Chicago Output Unchanged But Bookings Recede

Adoption of Steel Code May Lead to Further Price Revisions — Better Demand from Agricultural Areas Looked For

CHICAGO, Aug. 22.—Although the volume of steel bookings in the Chicago district has continued to recede, ingot operations are being sustained at about 47 per cent, which is the same rate as a week ago. The declining sales trend is attributed to seasonal factors and to the reluctance of buyers to make further commitments until the effect of the NRA program on industry becomes more clearly defined. However, the signing of the steel code has already resulted in a better feeling throughout the steel trade, as buyers and sellers alike see some of the clouds of uncertainty surrounding their business being dissipated.

Although the new price schedules under the code have not yet been determined, it is conceded that in some commodities they will be higher than present quotations. Whether the differential of $2 a ton at Chicago over the Pittsburgh base price is to be continued on bars, shapes and plates is still a subject of discussion.

It is conjectural whether the possibility of higher prices will drive in much further steel tonnage. The trade is largely of the opinion that users will temporarily hold to their present policy of buying only what they actually need for immediate fabrication until some of the uncertain factors affecting their business are ironed out and the trend of consumption is better known. Railroad purchases of equipment and rails are apparently as far in the future as they were a week ago. Many reports are current about contemplated buying programs but when traced to their source have no basis in fact. The only pending railroad inquiry is for 673 underframes, requiring 3300 tons of steel, for the Fruit Growers Express.

A survey of the agricultural outlook reveals promise of increased purchasing power by the farmer. Despite smaller grain crops, it is estimated that because of higher prices the farmer will receive this year about $750,000,000 more than he did in 1932. In addition, he will get a substantial bonus from the Government for curtailing his plantings. Altogether, this increase in income should be reflected in larger purchases of farm implements, wire goods and other products.

Flat-rolled steel bookings continue in better volume than heavier items, with the automobile industry and the brewery trade the best sources of business.

Pig Iron

Shipments in the first 20 days of August were considerably ahead of those in the same period of July, but fresh orders have been light in volume and confined to small lots. Producers are looking forward to an increase in sales after Sept. 1, when books for the fourth quarter will be opened.

Strip Steel

Mill operations in both hot and cold-rolled strip have declined, but shipments, particularly to the automobile trade, have been fairly good. Manufacturers of electrical specialties for the Christmas trade have been active buyers of cold-rolled strip.

Reinforcing Bars

The State of Wisconsin has let six general contracts for highway work, requiring 1050 tons of reinforcing bars, 200 tons of which has been placed with the Concrete Engineering Co. G. R. Fehr, Inc., Milwaukee, which has the contract for the extension to the Milwaukee municipal sewage plant, is expected to purchase this week the bars for this project, estimated at 3168 tons. Although several mid-western states, including Illinois, have received large Federal grants for road construction, their highway programs have not yet been perfected. Shop operations continue at a low rate.

Structural Material

The award of 1275 tons of steel for a bridge over the Illinois River at Morris, Ill., on which the McClintic-Marshall Corpn. is low bidder, has been held up on account of litigation, but it is believed that the legal entanglements will be swept aside by the end of this week. New jobs are more numerous. Three local projects will take a total of 1500 tons and a highway bridge in Buchanan County, Mo., 1000 tons. The Federal Government is about to ask for bids for dam No. 4 on the Mississippi River, requiring 1000 tons of steel. With steel apparently headed toward higher levels, prices of fabricated structural steel are showing a tendency to stiffen. It is estimated that since March 1 fabricated steel has risen an average of $16 a ton, and further advances are promised as production and materials costs increase.

Bars

The decline in the volume of incoming business, which first became pronounced a week ago, has not been checked. However, now that the steel code has been signed and the trade feels that higher rather than lower prices probably will be in order, mills believe that the downward trend will be checked. Although users generally have anticipated higher prices to some extent in making recent purchases, it is conceded that if the new schedules to be worked out this week by the industry provide for a further advance, considerable tonnage will be driven in immediately at current prices. Steel companies are protecting buyers at 1.70c., Chicago, until the end of August.

Warehouse Business

Contrary to the seasonal trend, business in the first half of August slightly exceeded that in the same period in July, with the volume well distributed among all items, except large sizes of structural shapes. Jobbers have put into effect extras ranging from 50c. to $3 for small quantities of wrought washers.

Sheets

Specifications and orders have been fairly good, showing little change in volume from previous week. They have been spread over a large variety of users, although the automobile industry still is the leading source of business. However, fresh buying has not been sufficiently brisk to offset production, and therefore mill backlogs are continuing to shrink.

Wire Products

Bookings have declined slightly but remain surprisingly good for this time of the year. Mills are wondering how much of the current buying is supported by actual consumption and how much by the desire of users to place orders now, with the threat of higher prices hanging over them. Tonnage from jobbers has been in especially good volume. Manufacturers are looking forward to a pick-up in demand in the agricultural areas this fall, after the farmer has received cash for his crops and the Federal Government has distributed over $100,000,000 as a bonus for restricting production.

Scrap

With consumers adhering to a policy of marking time until the details of the steel code are known and until the trend of future operations is more clearly discernible, scrap buying is exceedingly light. Dealers, pursuing an equally cautious policy, are largely confining their activities to covering present orders on their books. Steel mills have fairly comfortable stocks of scrap on hand and are not eager to take in more material. Nevertheless, they are accepting restricted tonnages on current contracts.

Finished Steel Demand Off Further in New York Area

Tonnage This Month Is 10 to 15 Per Cent Behind Corresponding August Totals — Large Plate Tonnages Before Trade

NEW YORK, Aug. 22.—Specifications for finished steel products in this district continue to lag, although aggregate tonnage in the month to date is only 10 to 15 per cent under corresponding July business. A further comparative decline before the month-end is likely as the last few days of July brought heavy specifications for bars, plates and shapes because of the price advance.

Failure of structural steel tonnage to show any substantial gain continues to disappoint local sellers. Reports from Washington indicate that plans for Federal projects are being pushed and engineering offices in the metropolitan district are somewhat busier on private projects. State appropriations for highway work are being pushed and New Jersey will soon release plans for shore improvements to cost $2,000,000, which will involve large tonnages of sheet steel piling. Several hundred tons of piling will also be required in the construction of the Grand Island bridges. Demand for plates is more active, with two tank jobs requiring 7000 tons now before the trade, while a steamship for Gulf service requiring 4000 tons will soon come up for bids. A local fabricator has taken 3400 tons of tanks for export to Argentina. Demand for the lighter steel products is generally slower, although an exception may still be made in the case of tin plate. The recent high rate of releases shows little decline and mill backlogs extend through September.

The full implications of the acceptance of the steel industry's code are not yet clearly defined. The prices to be filed with the American Iron and Steel Institute by Aug. 29 are generally expected to be the same as those now quoted. The possibility of revision later on is not out of the question, but it is pointed out that advances would be no more surprising than reductions. The industry understands that it is not to sell its products below cost and the Recovery Administration would likely be as interested in preserving this part of its agreement with industry as in safeguarding consumers against excessive price advances.

Pig Iron

Fresh buying has eased off, and present activity is slow and generally confined to spot carloads. The price structure is unchanged and holding steady for both domestic and foreign brands. Sales aggregated 3000 tons for the week, contrasting with 5800 tons for the previous period and 2600 tons two weeks ago. Releases are generally well ahead of contract schedules, and several sellers expect their August shipments to exceed those of any month during the past two years. Consumers are awaiting more definite industrial orientation under code provisos, and since August is considerably overbought they recognize no necessity for precipitate action. Within two weeks furnaces are expected to announce fourth quarter prices and open books. Import brands are sharing in the consumer indisposition to buy. The flow of foreign iron shows no significant change. In fact, there has been little variation in average monthly imports for the past 20 years.

Reinforcing Steel

Public works continue a potential support to this market, although current lettings are in insignificant volume. Bookings of small lots for private projects have improved but are still negligible. Consequently general demand is at low ebb, and distributers are practically inactive. Quotations are unchanged but nominal. Code provisions have been clarified, and fourth quarter mill prices will be announced shortly. This should result in improved bookings as considerable tonnage has been withheld because of estimators' inability to secure firm quotations. The American Steel & Wire Co. will furnish 120 tons of mesh for New York State highways. Additional lettings of mesh, together with 210 tons of bars will be announced within a week.

Scrap

Consumer disinterest in eastern Pennsylvania and in the Pittsburgh district has been reflected in local market weakness. Quotations are nominally unchanged. With moderate price sagging imminent brokers have become wary, and are not inclined to take a long position despite liberal yard offerings. The current inactivity is partially an outgrowth of codification delay and industrial recession arising from difficulties in the coal areas. Little improvement in market tone is expected prior to Labor Day. Shipments are in heavy volume, and contracts are being rapidly liquidated. Sellers here have expanded export dealings, and heavy shipments are going out of Birmingham and Gulf ports. Willingness to enter this market at domestic levels is confined to Japanese, Italian and Polish melters, and current shipments will undoubtedly greatly increase their 1933 tonnage which even now exceeds the corresponding 1932 level by over 300 per cent.

Demand Subsides Further in Eastern Pennsylvania

Greater Price Stability Expected When Code Gets Into Operation on Aug. 29 —Inquiry for 10,000 Tons of Basic— Scrap Quiet

PHILADELPHIA, Aug. 22.—A further let-up in demand for steel is reflected in the market and open-hearth operations have dropped another point to about 44 per cent of capacity.

The decline in new business was anticipated in view of recent heavy specifications and actually is not so great as some mills had expected. Plate and shape tonnage especially is down, while merchant bar and sheet demand is holding up fairly well. Backlogs, however, are being absorbed, and unless business gathers momentum September bookings will fall below those of August.

The trade looks for greater stability in prices now that the code has been approved and will be put into operation at once. There are, however, but few soft spots in the market at present, although reports are heard of shading in some lines, including cold-rolled sheets.

Many angles of the code are being discussed. One point frequently mentioned relates to the discount rate of ½ of 1 per cent for payment within 10 days in the East and 25 days on shipments to Pacific ports, with interest applying after expiration of the net periods. At present some invoices, such as those applying to tin plate, wire products and pipe, take a discount of 2 per cent when paid in 10 days. The difference in this rate and the ½ per cent will increase consumer prices, making a difference of about $1.28 a ton in the case of tin plate. The interest rate is expected to expedite payments, which heretofore have been deferred beyond the net periods.

ig Iron

A nearby consumer has put out an inquiry for 10,000 tons of basic iron for third quarter shipment. A melter in New Jersey is reported to have closed for 400 tons of Royal Dutch iron, said to be selling at about $1 a ton under domestic foundry grades. Books for the fourth quarter probably will be opened next week. Indications are that present prices will be continued unless it is found necessary to increase them by reason of operating under the code. Demand from gray iron foundries has picked up somewhat and reflects improvement in operations of stove makers.

Plates, Shapes and Bars

Plate and shape business has fallen off substantially. Fabricators report that inquiries have dropped to a low point, both from the point of view of numbers and volume. Breweries, however, are planning additions which promise to develop into business soon. Railroad buying is unusually light.

Sheets

Although new specifications have declined, sheet demand is holding up fairly well. Automotive business has slackened somewhat. The let-down is attributed chiefly to plans of makers for new models. After the new program is arranged resumption of buying on a good scale is looked for. Inquiry for hot-rolled material is better than that for cold-rolled sheets. It is reported that concessions have been made to large buyers of the latter grades, but firmness in prices is predicted now that the code has been approved.

Warehouse Business

Tonnage coming to jobbers has declined but still remains at a fair volume. August business will run below that of July.

Scrap

The market is marking time. Mills continue to postpone purchases. The tone of the market is easier, but there have been no transactions to warrant changes in prices.

Birmingham Market is Marking Time

BIRMINGHAM, Aug. 22.—The pig iron market is quiet. Foundries are drawing on previous commitments and new business is limited. Shipments have slowed up slightly since July, but the recession has not proved disturbing as yet. The stimulation felt by foundries in June and July has begun to wear out and new castings orders have become more irregular. In many cases stock requirements have also been satisfied, with the result that these two factors are adversely affecting the movement of pig iron. No change has occurred in furnace operations since Aug. 10, with eight stacks active, five on foundry iron and three on basic. The market is firm at $13. Producers are still unwilling to book tonnage for the fourth quarter.

Steel bookings have declined materially since the first of the month, the impetus of speculative buying and stock rebuilding having passed to a great extent. There is no particular activity in any line. Mills are still operating at a good rate, handling business previously booked. Thirteen open-hearth furnaces were active last week end the same number is scheduled for operation this week.

Code Adoption Steadies Market at Cleveland

Removal of Uncertainty Has Favorable Effect—Ingot Rate Drops Two Points to 63 Per Cent of Capacity—Mills Running on Backlogs

CLEVELAND, Aug. 22.—The adoption of the steel code has eliminated some of the uncertainties that caused a slackening in the volume of steel business and will probably expedite codification in some of the metal-working industries. Drop forgers and some other metal-working industries have been deferring final action in completing their codes awaiting the approval of the steel code. With the attention of consuming industries centered on regulations under their proposed codes, demand for finished steel showed a further decline the past week.

Ingot output in the Cleveland-Lorain territory has again fallen off slightly, due to the taking off of one open-hearth furnace in Lorain. Operations in the territory this week are 63 per cent of capacity, or a decline of two points. Mill backlogs have been materially reduced and finishing mill operations have been curtailed. Activity is largely in specifications against contracts. While there is little new demand from the automotive industry, specifications for sheets and strip steel from that source are holding up fairly well.

Attention is now being given to price changes that may follow the adoption of the steel code. With most consumers under contract for this quarter, changes in price are not expected during the remainder of the quarter. The market is firm on practically all products. Sheet prices for the coming quarter are expected to be announced shortly.

Iron Ore

Shipments have been further increased by the placing of additional Lake boats in operation. There are 217 Lake freighters in commission, or 65 per cent of the total number, and of these 185 are in the ore trade, an increase in 30 days of 69 boats hauling ore.

Consumption of ore in July was 2,626,293 tons, an increase of 732,289 tons over June, and comparing with 644,732 tons in July last year. Ore at furnaces and at Lake Erie docks Aug. 1 amounted to 27,771,734 tons as compared with 32,059,061 tons on the same date last year. Furnace stocks Aug. 1 were 22,979,543 tons. Central district furnaces in July consumed 1,601,231 tons, a gain of 448,857 tons. Lake front furnaces consumed 1,023,311 tons, an increase of 284,930 tons, and all-rail furnaces consumed 1526 tons, a gain of 1069 tons. Eastern furnaces used only 225 tons, a loss of 2567 tons. There were 94 furnaces using Lake ore in blast July 31, an increase of 12 for the month.

Pig Iron

Shipments continue heavier than in July, but new buying is light. Shipping orders and operations of some jobbing foundries have been stimulated by orders for castings for future requirements. Some buyers that expected higher prices under the operation of various codes are reported to have purchased enough castings to last them through the remainder of the year. Renewed market activity is expected next month when furnaces open their books for the fourth quarter. Much of the iron that is being delivered at present was sold before the advance to present prices. Because of increased labor and fuel costs a price advance of perhaps $1 a ton is predicted for the coming quarter. Prices are steady at $16.50, Cleveland, for foundry and malleable iron for local delivery and outside shipment.

Bars, Plates and Shapes

With little new business from the automotive industry, demand for bars is light. However, orders for alloy bars from this industry are holding up remarkably well, and there is good demand for bars from the forging industry. Cleveland will take bids Sept. 7 for tanks for the Easterly sewage treatment plant, requiring 800 tons of plates. The 5000 tons of plates required for water main extensions have not yet been placed.

Structural inquiry continues very light. Prices are firm at 1.65c., Cleveland, for steel bars, and 1.60c., Pittsburgh, for plates and shapes.

Sheets

New demand is holding up fairly well, but orders are confined to shipments before Oct. 1, as producers are declining to sell for delivery beyond that date. With a possibility of higher prices, some buyers have attempted to place tonnage for the last quarter. Mill backlogs have been materially reduced, although producers have enough of some grades to keep them busy through September. One mill still has on order a large tonnage of black sheets for beer barrels. Some of the refrigerator manufacturers have ordered all the sheets they will require under their present production schedules.

Strip Steel

Specifications from some plants in the automotive industry are holding up well, but new business is light. Shipments against old orders to some of the leading automobile accessory plants will be about cleaned up this month. These plants will shortly start production on new designs of lamps and other accessories for which new steel orders will be placed. Prices are steady at 1.65c., Pittsburgh, for hot-

rolled strip and 2.25c., Cleveland, for cold-rolled material.

Scrap

With reduction in steel plant operations, several northern Ohio mills are holding up scrap shipments and whatever purchases are being made by dealers are for other districts. The market has a weaker tone and blast furnace grades are down 25c. a ton. While steel-making scrap is unchanged, dealers are offering lower prices for these grades but report that so far they have not been able to buy at concessions.

Demand Eases Off at Cincinnati

CINCINNATI, Aug. 22.—Interest in pig iron has abated, and consumers appear to be more eager to receive shipments on old contracts than to consider further requirements. As a result, the movement of iron has been larger than in any previous period this year, but the melt has not expanded a great deal. Furnace representatives have not yet opened their books for fourth quarter business. Bookings, the past week, were about 300 tons in scattered carload lots to cover urgent needs of melters. Inquiry has virtually disappeared and orders are largely the result of direct solicitation.

Coke

Movement of foundry coke on contract is being well sustained but new business is sluggish.

Steel

Sheet demand has eased still further, but mill operations are being sustained at slightly less than 70 per cent of capacity. Backlogs have been cut almost in half, bringing excess business to about one week's continuous production at the present rate. Business from the automobile industry has slackened in keeping with preparations for model changes. Other sheet users have not reduced their specifications materially, although there are some evidences of seasonal reaction.

Scrap

Declining mill business is reflected in a marked reluctance to make forward commitments in scrap. Prices are steady and there is a disposition among dealers to favor long sales wherever possible. Only a few items of the Louisville & Nashville list are reported to have been sold, the remainder of the offering having been withdrawn.

The Los Angeles Bureau of Water and Power has taken bids on 280 tons or 348 tons of hot-rolled black copper rod, Specification No. 3200.

Fabricated Structural Steel

Awards Again Decline—New Projects in Large Volume

STRUCTURAL steel lettings of 4800 tons are the smallest since the middle of June and compare with 6300 tons a week ago. The largest booking, 1800 tons, is for a bakery for the National Biscuit Co., New York. Among new projects of 61,150 tons is 45,450 tons for the Coulee Dam at Seaton's Ferry, Wash., on which bids are expected about the first of next year. Other new jobs include 1600 tons additional for the Rockland County Hospital at Orangeburg, N. Y., and 1500 tons each for the Fifth Regiment Armory, Baltimore, and lookout towers for the Department of Agriculture, Washington. In addition to structural material, the Coulee Dam will require 21,430 tons of plates. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

New York, 350 tons, 252 West Eighty-seventh Street garage, to George A. Just Co.

New York, 1800 tons, Tenth Avenue bakery for National Biscuit Company, to American Bridge Co.

Spring Brook, N. Y., 130 tons, Pennsylvania Railroad bridge, to American Bridge Co.

Genesee County, N. Y., 200 tons, State bridge, to Lackawanna Steel Construction Corpn.

Saugerties, N. Y., 450 tons, State highway bridge, to Lackawanna Steel Construction Corpn.

Newark, N. J., 570 tons, bridge for Central Railroad of New Jersey, to Phoenix Bridge Co.

Baltimore, 190 tons, roof shield for Arundel Corpn. building, to American Bridge Co.

Cumberland, Md., 150 tons, high school, to Guibert Steel Co.

CENTRAL STATES

Bureau County, Ill., 100 tons, bridge to Midland Structural Steel Co.

Milwaukee, 600 tons, grade separation bridge, for Milwaukee Road, to Wisconsin Bridge & Iron Co.

St. Louis, 150 tons, building for American Steel Foundries, to Missouri Bridge & Iron Co., St. Louis.

WESTERN STATES

North Hollywood, Cal., 100 tons, post office, to McClintic-Marshall Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Orangeburg, N. Y., 1600 tons, additional buildings for Rockland State Hospital.

State of New York, 1725 tons, State highway projects.

New York, 1100 tons, American Museum of Natural History planitarium.

Washington, 1500 tons, look-out towers for Department of Agriculture.

Baltimore, 1500 tons, Fifth Regiment Armory.

THE SOUTH

Fort Royal, Va., 600 tons, bridge over Rappahannock River.

State of West Virginia, 1125 tons, State highway bridges.

CENTRAL STATES

State of Michigan, 475 tons, bridges.

Terre Haute, Ind., 330 tons, bonded warehouse for Commercial Solvents Co.

Fort Wayne, Ind., 400 tons, building for Berghoff Brewing Co.

Chicago, 400 tons, nurses' home for Cook County.

Chicago, 750 tons, train shed at LaSalle Street station.

Chicago, 350 tons, subway at Ashland Avenue for Santa Fe Railroad.

Alma, Wis., 1100 tons, Mississippi River Dam No. 4.

Hollister, Mo., 118 tons, State highway bridge; bids to be opened Aug. 25.

State of Missouri, 1000 tons highway bridge in Buchanan county.

WESTERN STATES

Larimer County, Colo., 184 tons, two highway bridges; bids Aug. 30.

Trona, Cal., 175 tons, American Potash & Chemical Co. factory; bids soon.

Baker County, Ore., 150 tons, State highway bridge over Burnt River; bids Aug. 25.

Mare Island, Cal., 400 tons, two destroyers for Navy; bids about Oct. 1.

Puget Sound, Wash., 400 tons, two destroyers for Navy; bids about Oct. 1.

Seatons Ferry, Wash., Grand Coulee Dam, 45,450 tons, low dam, 8970 tons, and high dam, 36,480 tons; bids expected on low dam about first of next year.

Seatons Ferry, Wash., Grand Coulee Dam, 47,180 tons of sheet piling, 23,590 tons each for low and high dams; bids expected on low dam about first of next year.

Carlsborg, Wash., 485 tons, State highway bridge; bids Aug. 29.

FABRICATED PLATE

AWARDS

Detroit, 600 tons, tanks for Shields Pfeiffer Brewing Co., to Chicago Steel Tank Co.

Los Angeles, 100 tons, tanks for Metropolitan Water District, to American Pipe & Steel Corpn.

Buenos Aires, Argentine Republic, 3400 tons, Ultramar Petroleum Co. tanks, to McClintic-Marshall Corpn.

NEW PROJECTS

Cleveland, 800 tons, presettling tanks for Easterly sewage treatment plant; bids Sept. 7.

Mare Island, Cal., 1200 tons, two destroyers for Navy; bids about Oct. 1.

Grand Coulee Dam, Wash., 21,430 tons, low dam, 8715 tons additional, and high dam, 12,715 tons; bids expected on low dam by first of next year.

Puget Sound, Wash., 1200 tons, two destroyers for Navy; bids about Oct. 1.

Pipe Lines

Independent Utilities Co., Jackson, Miss., plans natural gas steel pipe line from Jackson to Muscle Shoals, Ala., with branch line to Ackerman, Miss.

General Purchasing Officer, Panama Canal, Washington, asks bids until Sept. 1 for 68,700 ft. steel or wrought iron pipe (Schedule 285).

Central Michigan Natural Gas Corpn., Lansing, Mich., is being organized by Alfred H. Doughty, Lansing, former mayor of city, and associates, to build a steel pipe line from Mount Pleasant, Mich., gas field district to Lansing and vicinity, where application is being made for a natural gas franchise.

Cleveland has let contract to Carroccio & Gaudio Construction Co., city, for 30,482 ft. of 30 and 36-in. steel pipe, Divisions 1 and 3, new pipe line for water supply, and to Cogit Construction Co., city, for 5500 ft. of 48-in. electric welded steel pipe for Division 2.

Youngstown Sheet & Tube Co., Youngstown, has secured order for 6000 tons of 18-in. electric welded steel pipe for new line for Northern Gas & Pipe Line Co., Rush County, Kan., for connection with main natural gas trunk line.

Western Gas Co., El Paso, Texas, will start work within 15 days on a natural gas pipe line from Douglas, Ariz., to Tucson, Ariz., and ultimately to Phoenix. Total length of line will be 253 miles, requiring 16,000 tons of 10¾-in. steel pipe. Company will finance work from proceeds of a $2,200,000 loan granted by Reconstruction Finance Corpn.

Steel Output Drops Further at Buffalo

BUFFALO, Aug. 22.—The Lackawanna plant of the Bethlehem Steel Corpn. has reduced the number of its active open-hearths to six and may shut down altogether for a part of this week. Republic Steel Corpn., continues to operate eight furnaces and Wickwire-Spencer Corpn., two. The Seneca sheet division of Bethlehem has reduced operations to about 50 per cent of capacity.

An addition to the Marine Hospital, Buffalo, will require 450 tons of reinforcing bars, but it is uncertain as to when the project will go forward.

The pig iron market is very quiet, with sales at a minimum. No fourth quarter prices are being quoted. The General Electric Co. is in the market for 200 tons of malleable for its Erie, Pa., plant.

Sales of machine shop turnings and short shoveling turnings have been made during the past ten days at $9.25, delivered Niagara frontier points. Reports of a sale of 2000 tons of No. 2 heavy melting steel at $10.50 to $10.75 are denied. Another consumer continues to offer $8.50 for No. 2 heavy melting steel, but is not obtaining material at this price from local dealers.

Sharp Gain in Prospective Structural Work on Coast

SAN FRANCISCO, Aug. 21.—Activity on the Pacific Coast has increased materially during the last 60 days, both at the mills and at the warehouses. Projects requiring major tonnages have been limited, due partly to the absence of Federal construction, but a greater number of small jobs, together with increased industrial demands, have improved business. Foundries, rolling mills and nut and bolt plants have all boosted production.

Prospective tonnage has increased sharply, with the appearance of inquiries for highway structures and anticipated Government work in the Pacific Northwest. New pending projects call for 96,436 tons of structural steel, 35,411 tons of reinforcing bars and 32,910 tons of plates. This is inclusive of the tonnages for the Grand Coulee Dam.

Awards for the week were limited to 143 tons of structural steel, 705 tons of reinforcing and 100 tons of plates. The United States Pipe & Foundry Co. took 1853 tons of cast iron pipe at Oakland, bringing total cast pipe awards for the week up to 2453 tons.

At Pasadena, Cal., Consolidated Steel Corpn. is reported low on 4220 or 5080 tons of plates for the Pine Canyon Dam conduit. The Bureau of Reclamation has taken bids at Denver on 4000 tons of reinforcing bars and approximately 5,000,000 ft. of steel tubing.

Reinforcing Steel

Awards 1015 Tons—New Projects 24,515 Tons

State of Wisconsin, 200 tons highway work, to Concrete Engineering Co.

Milwaukee, 150 tons, power plant, for Veterans' Hospital, to R. L. Gilbertson, Milwaukee.

San Jose, Cal., 190 tons, Continental Can Co. factory, to Soule Steel Co.

Denver, 300 tons, material for Bureau of Reclamation, Specification No. 3269A, to Colorado Fuel & Iron Products Co. and Pacific Coast Steel Corpn.

Seattle, 175 tons, Continental Can Co. factory, to Pacific Coast Steel Corpn. and Northwestern Steel Rolling Mills.

NEW REINFORCING BAR PROJECTS

Buffalo, 450 tons, addition to Marine Hospital.

State of Missouri, 150 tons of bars and 300 tons of wire mesh for highway projects; bids Aug. 25.

Denver, 4000 tons, material for Bureau of Reclamation, Specification No. 3285; bids under advisement.

State of Montana, 133 tons, highway bridges in four counties; bids under advisement.

Los Angeles County, Cal., 324 tons, outlet tunnel at San Gabriel Dam No. 1; bids Sept. 5.

State of Oregon, 204 tons, highway bridges in Clatsop and Baker counties; bids Aug. 24.

Seatons Ferry, Wash., Grand Coulee Dam, 19,250 tons; low dam, 2000 tons additional, and high dam, 17,250 tons; bids on low dam expected by first of next year.

Cast Iron Pipe

Harrisburg, Pa., has authorized 6-in. water line in part of Sixteenth Street.

Sanitary District Board, Roanoke Rapids, N. C., asks bids until Aug. 31 for pipe line for water service. Spoon & Lewis, Roanoke Rapids, are consulting engineers.

Eau Claire, Wis., asks bids until Aug. 30 for 1876 tons of pipe and fittings, including special river crossing joints, for water supply system. Pearse, Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Elsberry, Mo., plans about 2¾ miles of 6-in. for expansion in water system. Russell & Axon, Roosevelt Building, St. Louis, are consulting engineers.

Brea, Cal., plans 10-in. line for water supply from city reservoir, in connection with a $60,000 expansion program. R. W. Phelps is city engineer.

Victorville County Water District, Victorville, Cal., plans water distributing system of 37,180 ft. of 4 and 6-in. pipe, in connection with $50,000 expansion program. Burns-McDonnell-Smith Engineering Co., 1031 South Broadway, Los Angeles, is consulting engineer.

Oakland, Cal., has awarded 1853 tons of 4 to 8-in. to United States Pipe & Foundry Co.

Los Angeles County, Cal., has awarded 100 tons to United States Pipe & Foundry Co. for fair grounds at Pamona.

Whittier, Cal., has completed plans for 23,230 ft. of 4 to 10-in.

Fresno, Cal., has ordered 400 tons from Pacific States Cast Iron Pipe Co.

Railroad Equipment

Hershey Corpn., Hershey, Pa., is taking bids on 10 all-steel 50-ton double hopper cars.

... PERSONALS ...

WILLIAM T. CONLON has been appointed by the Superheater Co., New York, manager of its industrial department. In this capacity, he will have charge of the design, manufacture and sale of Elesco superheaters for all types and makes of boilers for public utility and industrial power plants. The products of this department also include desuperheaters, reheaters, furnace water walls and miscellaneous heat exchange apparatus for power plants and process industries. Since November, 1929, Mr. Conlon has been serving in an executive sales capacity. Prior to joining the Superheater Co., he was associated with Utica Gas & Electric Co. He is a graduate mechanical engineer from Purdue University, class of 1920.

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T. H. GERKEN, resident editor of THE IRON AGE at Pittsburgh, has been appointed news editor with headquarters at the main office in New York. He has been succeeded at Pittsburgh by GEORGE EHRNSTROM, JR., heretofore attached to the New York office. Mr. Gerken was born at Jackson, Ohio. He attended Ohio University, Athens, Ohio, and Northwestern University, Evanston, Ill., having been graduated from Northwestern University in 1926. He became identified with the editorial staff of THE IRON AGE at New York June 17, 1926, and was transferred to Pittsburgh as resident editor on April 1, 1929. Mr. Ehrnstrom attended both New York University and Columbia University and got his early journalistic experience free-lancing for daily newspapers at St. Augustine, Fla., in 1923. In 1924 he became associated with Pilling & Co., Inc., pig iron broker, in the New York office where he was assistant to Ralph W. Clark, vice-president. From 1929 until 1931 Mr. Ehrnstrom was in charge of the New York office of Pilling & Co., Inc., and on May 9 of the latter year he joined the editorial staff of THE IRON AGE.

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HARRY A. PILLEN has been appointed district sales agent at Cincinnati for the Erie City Iron Works, Erie, Pa.

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JOHN O. WEBER has been appointed sales representative of the Coppus Engineering Corpn., Worcester, Mass., with headquarters at Louisville, Ky.

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MEAD F. MOORE has been appointed chief engineer of the Nash Motors Co., Kenosha, Wis. He has been associated with the company since its inception and in 1922 was placed in charge of the Milwaukee engineering department. Last year he was made chief engineer of the Racine engineering division. In his new capacity he will have general supervision of all Nash engineering activities under N. E. Wahlberg, vice-president in charge of engineering.

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WILLIAM H. MOORE has been appointed district manager at Chicago for the Peninsular Grinding Wheel Co., Detroit. He has been connected with the Metal & Thermit Corpn. and the Burnside Steel Foundry Co. as well as with the railroads.

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CHARLES F. NORTON, formerly vice-president and general manager, Howell Electric Co., Howell, Mich., has joined the Louis Allis Co., Milwaukee, in an executive sales capacity. The Allis company, manufacturing electric motors, recently has established new sales offices in Seattle, Baltimore, Kansas City, Omaha and Dallas, and plans are in progress to open offices in 10 more cities, in addition to the present 35 offices.

FRED R. ERBACH, for the past 18 months chief engineer, General Refrigeration Co., Beloit, Wis., has been appointed vice-president and general manager. He entered the refrigeration industry in 1923. Prior to joining the Beloit organization he was assistant chief engineer, Kelvinator Corpn., Detroit. He has gained wide note as an inventor and designer, especially in the application of large units, in which the Beloit concern specializes.

* * *

FRANK L. ESTEP, vice-president Perin Engineering Co., New York, returned Aug. 17 after an extended stay in India at the works of the Tata Iron & Steel Co., where sheet mills were extended and remodeled, as mentioned recently in these columns in reporting a series of notable production records made on the rearranged mills. Mr. Estep's travels on the way back took him to China and Japan.

* * *

GEORGE BOOLE has been appointed senior vice-president and resident manager at San Francisco of A. M. Castle & Co. to succeed the late ROY L. SANFORD. ERSKINE CAMPBELL has been made resident manager at Seattle to succeed Mr. Boole.

Grand Coulee Dam to Take Large Steel Tonnage

A fund of $377,000 has been set up for surveys and the preparation of contract plans and specifications for the Grand Coulee Dam, a unit in the Columbia Basin project, located at Seaton's Ferry, Wash., on the Columbia River. Present plans call for a 145-ft. dam so constructed that later it may be raised to 350 ft. Test borings are expected to be advertised for shortly, with construction scheduled to start in the spring of 1934.

Estimates of the tonnages of steel required follow:

	Low Dam	High Dam
Reinforcing steel	13,500	17,250
Sluice gates	4,065	7,840
Structural steel	4,080	19,155
Penstocks	12,715	12,715
Steel sheet piling	23,590	23,590
Miscellaneous steel	825	9,485

Welded Steel for Diesel Engine Structures

(*Concluded from Page 29*)

Fig. 6 shows another crankcase of the same type, with its welded bearing girders. These early crankcases were of tie-rod construction, the welded steel case serving as a stabilizing medium for the tie rods.

It is a common misconception that the tie rods take all the load. Tie rods, if they are screwed up and set properly by means of strain gages, bring into play the rigidity of the crankcase. The material which is compressed when the rods are screwed up adds its flexural rigidity to the flexural rigidity of the rod. It is just as important in the case of tie-rod construction to eliminate stress concentrations as it is in the case of an engine in which the gas load is carried entirely by a weld. The frame is subjected to the same alternations of stress whether the tie rods are in place or not. The only condition under which the frame can be entirely relieved of stress occurs with loose tie rods. The engines shown in Figs. 5 and 6 were built of low carbon welding quality steel with endurance values for an indefinitely repeated stress of 30,000 lb. per sq. in. The weld metal used to join the components had an endurance limit of 28,000 lb. per sq. in. established by rotating beam test on all-weld metal specimens. It was then a matter of eliminating all undercuts, unfused welded joints, and surface discontinuities of any type, since it is easy, at an average stress of 5000 lb. per sq. in., to incorporate a stress factor of five or six, which would mitigate against indefinite service life. The crankcases weigh about 5 lb. per hp.

(*To be concluded*)

Valley Steel Operations Undergo Further Recession to 58 Per Cent of Capacity

YOUNGSTOWN, Aug. 22.—August steel bookings are gradually diminishing, and aggregate tonnage for the month will probably fall considerably short of July business. Backlogs, however, have not yet been sufficiently reduced to seriously affect steel operations in the Valley. Fifty out of 83 openhearths in the district are engaged, and ingot output in the past two weeks has receded only two points to 58 per cent of capacity. The Republic Steel Corpn. has lighted its No. 3 Haselton blast furnace for a run on Bessemer pig iron, and 15 out of 31 stacks in the district are now being operated.

With the steel code accepted for a 90-day period executives here look for an early release of considerable buying that had been held up pending codification. The seasonal shrinkage in demand is therefore expected to be short-lived. Further support is expected from the automotive industry, following establishment of its code, when attention to new models will likely open up a renewed demand for steel. Meanwhile, Valley mills are anticipating changed conditions growing out of provisions of the steel code, and are engaging additional workers, who are being trained in preparation for the expected fall improvement in operations.

Semi-finished products are moving rather steadily, with shipments of sheet bars to tin mills particularly brisk. Demand for tin plate has lost none of its vigor, and tin plate producers are still being taxed to meet the urgent needs of consumers. Full-finished auto body sheets and strip steel have naturally felt the effects of tapering activity in the automotive field. Calls from the refrigerator manufacturers, however, are fairly well sustained. Miscellaneous sheet demand, however, is still depressed by code uncertainties, but seasonal fall buying is expected soon from radio makers and household equipment manufacturers.

Current demand for pipe is extremely light. Standard pipe is moving sporadically. Oil country goods are dormant and the line pipe market is devoid of important inquiry. The Youngstown Sheet & Tube Co.'s electric weld pipe mill at Brier Hill will be engaged for approximately three weeks on production of 6000 tons of 18-in. pipe purchased recently by the Northern Gas & Pipe Line Co. for connecting its Rush County, Kans., gas field with its main line in that district. Pipe prices are beginning to resist irregular tendencies. Not much benefit, however, has accrued from the increased quotations established on July 1, in view of the fact that the bulk of current deliveries is against old low-price contracts.

A contraction in demand for rolls and ingot molds has accompanied the diminishing tendencies in steel operations. Mill equipment manufacturers are still occupied on old commitments, but fresh calls for installations are lacking. Projected erection of an alloy steel bar mill for the Youngstown Sheet & Tube Co. is not yet assured.

Pig iron is dull. Prices, however, have maintained their recent strength and face possible upward revision as a result of increased wages and higher fuel costs. Fourth quarter quotations on pig iron are expected to be announced soon, but, in spite of the possibility of higher prices, the local consuming trade is not expected to evince much interest until October, when replenishment of stocks will generally be necessary.

Steel scrap purchases have been meager, and current demand is particularly apathetic. Nevertheless, No. 1 heavy melting steel has assumed nominal strength and is now quotably higher at $13.75 to $14.50. A recent sale of that grade into consumption was made at $14.

Fuel markets have held their recently advanced levels, but relief from strike influences has caused softness. Offerings of coal are generally neglected in view of the fact that the large steel company consumers are still accepting deliveries on contracts made during the strike with producers outside the western Pennsylvania fields. Coke is more readily available. A steel company producer of domestic coke, which had withdrawn its offerings during the coal strike, has reentered the market.

Car-Bottom Annealing Furnace Installations

(*Concluded from page* 21)

when maximum amount of gas is being burned in the furnace. When temperature reaches a point where burners cut into the intermediate setting, the damper closes somewhat, while at the low setting of burners the damper is practically closed. The adaptation of this automatic system of furnace pressure control means uniformity of temperatures, saving of fuel, minimizing of scaling, and easier manipulation for the furnace operator.

In addition to the many advantages that a car-type furnace has to offer from a standpoint of initial design and cost, maintenance, flexibility of control, and temperature distribution, we must not lose sight of the fuel cost per pound or ton of work treated. Although considerable data are available as to fuel consumption on many car-type furnaces, it is a difficult matter to give any general figures on fuel consumption, except for each particular installation. Consequently the accompanying data apply only to each specific job.

Data for three months on a large car-type furnace used for annealing all types of miscellaneous castings. The gas consumptions include all gas used for heating up, holding, and that used during the usual delays that are unavoidable in any foundry. The majority of the work was treated at a temperature of 1600 to 1650 deg.

Month	Total Pounds Treated (Net)	Total Cu. Ft. 530 B.t.u. Gas Used	Cu. Ft. per Ton
1	576,284	1,295,445	4,495
2	594,173	1,113,046	3,748
3	510,430	1,232,862	4,800

Small car-type furnace used for annealing steel castings:

	Heat No. 1	Heat No. 2	Heat No. 3
Net weight, lb.	13,075	15,625	6,400
Gross weight, lb.	16,520	19,170	9,845
Temp. of furnace at start, deg. F.	550	150	150
Soaking temperature, deg. F.	1,650	1,650	1,650
Time to reach temperature, hr. and min.	3 ; 5	3 ; 30	3 ; 10
Time soaking, hr.	2	2	2
Time — total, hr. and min.	5 ; 5	5 ; 30	5 ; 10
Total gas (600 B.t.u.), cu. ft.	21,200	29,800	20,440
Gas per lb. net, cu. ft.	1.62	1.91	3.19
Gas per lb. gross, cu. ft.	1.28	1.56	2.08

Heats No. 4 and No. 5

Net Weight: No. 4—11,250 lb. / No. 5— 7,675 lb.	18,925
Gross weight, lb.	25,815
Temperature of furnace at start:	
No. 4	350
No. 5	1,250
Temperature soaking, deg.	1,650
Time to reach temperature:	
No. 4	3 ; 10
No. 5	1 ; 45
Time soaking	2
Total time:	
No. 4	5 ; 10
No. 5	3 ; 45
Total gas (600 B.t.u.), cu. ft.	36,400
Gas per lb., net, cu. ft.	1.92
Gas per lb., gross, cu. ft.	1.41

Large car-type furnaces used principally for stress relieving of welded steel pressure vessels and large steel castings:

Furnace size—80 x 18 ft. and 22 ft. to arch from car.
Walls—9 in. insulating firebrick.
Gas used—530 B.t.u.
Maximum temperature, deg—1150
Charge—Box shaped steel casting; maximum cross section of 5 in.; weight, 100,000 lb.
Cycle—Heat to 1150 deg. F. in 5 hr. in cold furnace; hold at 1150 deg. F. for 5 hr.; cool to 400 deg. F. in 7 hr.
Total gas used—180,000 cu. ft.
Gas consumed per net pound treated—1.8 cu. ft.
Holding consumption at 1150 deg. F.—14,000 cu. ft. per hr.

Sellers Limit Offerings as Zinc Prices Are Reduced $3 a Ton

Copper Producers Hold Electrolytic at 9c. a lb. Despite Price Shading by Second Hands—Lead Position Improves—Tin Quiet

NEW YORK, Aug. 22.—Second hands entering at 8.75c. to 8.87c., prompt and cash, failed to break the long held 9c. position for electrolytic copper. These resale offerings, totaling several hundred tons, were quickly taken up by a producer for a wire fabricator. Fresh bookings at 9c. a lb., Connecticut Valley, were fair yesterday and today, although total sales continue at low volume. Considerable tonnage is backing up and will appear if consumers decide that smelters will permit no market recession. Heavy shipments continue, and the general expectation is that August releases will exceed the 42,000-ton July figure. In all probability custom smelters will accede to the producers' code, and full acceptance of the "weighted average production cost" will undoubtedly result in offerings beyond 9c. Throughout the week scattered foreign lots moved at quotations ranging from 8.20c. to 8c. a lb., c.i.f. usual Continental ports. Only negligible sales were recorded today on a first call listing of 8.15c.

Zinc

Always sensitive to consumer indifference, Prime Western finally broke to 4.95c. last Thursday as several first hands attempted to move their current intake. Additional weakness prevailed as import spelter dropped to 5.05c., Seaboard. Consumers, however, seeing a break from the protracted 5c. position became increasingly cautious, and only scattered car lots were moved yesterday at 4.85c. a lb., East St. Louis. October metal was placed and in several cases sellers had to make bookings into December for their regular trade at 4.85c. Quiet action was recorded today at 4.85c., and many first hands contend that 4.75c. may be reached. At this position producers may endeavor to cover their own long commitments. Sensing the market weakness, Joplin mines scurried to make liberal offerings at $35 a ton, and smelters are encountering no difficulty in securing all the concentrates they desire. However 4.85c. metal necessitates a decline from the $35 ore level if smelters are to profit, and easing in the Joplin district is momentarily expected. There is little likelihood that offerings below $32.50 will appear this week.

Tin

Consumers are ignoring the present market, and current activity is confined to negligible movement of Straits and standard. Spot Straits nominally settled today at 44.12½c. a lb. after a slight hardening during the week. There is no indication of reduced consumption as buyers continue to make heavy releases against old contracts. London operators withdrew from the market as the sterling position weakened, and official call today showed postings nominally set at £213 2s. 6d. for spot standard, £213 5s. for future standard and £219 12s. 6d. for spot Straits. The Far East position eased down to £219. During the week United Kingdom stocks dropped 865 tons to 18,240 tons as a result of a 1025-ton American consignment.

Lead

Although September requirements are less than 50 per cent covered, consumer reserve is increasing. Sellers are generally unable to place their daily intake. Buyers are watching the low London position and sterling strength for their possible effect on values here. Prices are quotably firm with future weakness unlikely, despite the 170,000-ton surplus hanging over the market. Considerable strength was injected into the domestic situation as principals inspected the July statistics. The stock reduction of 22,000 tons greatly exceeded expectations, and shipments rose 10,400 tons. The drastic reduction of 7500 tons in production presages an even more heartening statistical position if smelters continue to keep a close grip on output. Foreign postings were today unusually low at 2.39c. a lb. for spot and 2.45c. for futures. Nevertheless foreign metal is no threat to the domestic position, as import costs and incidentals still prohibit the entrance of bullion into a competitive position.

The Week's Prices. Cents Per Pound for Early Delivery

	Aug. 16	Aug. 17	Aug. 18	Aug. 19	Aug. 21	Aug. 22
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, New York	9.00	9.00	9.00	9.00	9.00	9.00
Straits tin, Spot, N. Y.	43.50	44.45	44.65	....	44.37½	44.12½
Zinc, East St. Louis	5.00	4.95	4.90	4.90	4.85	4.85
Zinc, New York	5.37	5.32	5.27	5.27	5.22	5.22
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.87½c. a lb., New York.
Brass ingots, 85-5-5-5, 9c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	45.50c. to 46.50c.
Tin, bar	47.50c. to 48.50c.
Copper, Lake	10.50c. to 11.25c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	17.12½c.
*High brass sheets	14.75c.
*Seamless brass tubes	16.37½c.
*Seamless copper tubes	16.62½c.
*Brass rods	12.25c.
Zinc, slabs	6.12½c. to 7.12½c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.00c. to 8.00c.
Lead, sheets	8.25c.
Antimony, Asiatic	8.50c. to 9.50c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal commercial grade	25.00c. to 50.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	47.50c.
Tin, bar	49.50c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	10.00c.
Zinc, slab	6.00c. to 6.25c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	51.50c.
Solder, ½ and ½	27.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.00c.	8.00c.
Copper, hvy. and wire	6.75c.	7.75c.
Copper, light and bottoms	5.75c.	6.25c.
Brass, heavy	3.75c.	4.50c.
Brass, light	3.50c.	3.75c.
Hvy. machine composition	5.25c.	6.00c.
No. 1 yel. brass turnings	5.00c.	5.625c.
No. 1 red brass or compos. turnings	5.00c.	5.50c.
Lead, heavy	3.625c.	4.00c.
Zinc	2.75c.	3.25c.
Cast aluminum	7.50c.	8.75c.
Sheet aluminum	12.00c.	13.50c.

Melting Scrap Lower at Detroit

DETROIT, Aug. 22.—With steel mills showing slight interest in making scrap purchases, heavy melting steel and hydraulic bundles have dropped 50c. and 25c. a ton, respectively. New factory busheling also is off 25c., but stove plate has increased a like amount. The local steel plant still is virtually out of the market, and shipments to other steel centers is in much smaller volume than a few weeks ago.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributors)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.i.f. Pacific ports	2.10c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.8155c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base. 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.95c.
Bars, f.o.b. Chicago	2c.
Bars, Cleveland	2c.
Bars, Buffalo	2c.
Bars, Detroit	2.15c.
Bars, eastern Michigan	2.20c.
Shafting, ground, f.o.b. mill, 1¼ in.	3.25c.
1-3/16 to 1½ in.	2.75c.
1-9/16 to 1⅞ in.	2.60c.
1-15/16 to 2⅞ in.	2.45c.
2-15/16 to 6 in.	2.30c.

*In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

No. 10, f.o.b. Pittsburgh	1.65c.
No. 10, f.o.b. Chicago mill	1.75c.
No. 10, del'd Philadelphia	1.96c.
No. 10, f.o.b. Birmingham	1.80c.
No. 10, c.i.f. Pacific Coast ports	2.27½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Chicago mills	2.35c.
No. 24, del'd Philadelphia	2.56c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	2.90c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.95c.
No. 10 gage, f.o.b. Chicago mills	2.05c.
No. 10 gage, del'd Phila.	2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.40c.
No. 20 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.56c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.65c.
All widths up to 24 in., Chicago	1.75c.
Cooperage stock, Pittsburgh	1.75c.
Cooperage stock, Chicago	1.85c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.25c.
F.o.b. Cleveland	2.25c.
Del'd Chicago	2.55c.
F.o.b. Worcester	2.45c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

Extras of 10c. a 100 lb. on mixed carloads, 20c. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

	Base per Keg
Standard wire nails	$2.10
Smoothed coated nails	2.10
Galvanized nails	3.60

	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Woven wire fence, base column	55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+9	+13
¼ to ⅜	57	38½	¼ & ⅜	+1	+21½
½	62	50½	½	-3	15
¾	65½	55½	¾	-3	20½
1 to 3	67½	58½	1 & 1¼	-3	25½
			1½	-4	28
			2	-4	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	66½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	67½	57½	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

¼	48¼	33½	⅛	+13	+45½
½ to ¾	54½	41½	¼ & ⅜	+2½	+34½
½	60	51	½	-32½	17½
¾	61½	55¼	¾	-37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 to 8	68	58	7 & 8	46	33
9 and 10	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	33	1½ in.	1
2½ in.—2¾ in.	40	1¾ in.	8
3 in.	47	2 in.—2¼ in.	13
3¼ in.—4¾ in.	50	2½ in.—2¾ in.	16
4 in.	52	3 in.	17
4½ in. to 6 in.	42	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	41
1¼ to 1½ in.	53	3¼ to 3½ in.	44
1¾ in.	37	4 in.	46
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	50
2½ and 2¾ in.	40	4 in.	52
3 in.	47	4½, 5 and 6 in.	42

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel), f.o.b. mill	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½-in. and smaller	2.40
Spikes, boat and barge	2.60
Tie plates, steel	1.90
Angle bars	2.55
Track bolts, to steam railroads	3.40
Track bolts, to jobbers, all sizes (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh, 72½, 25 and 10	
Stove bolts in packages, Ch'go, 72½, 25 and 10	
Stove bolts in packages, Cleveland, 72½, 25 and 10	
Stove bolts in bulk, P'gh	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.50
F.o.b. Chicago	2.60

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chi'o and Birm'g'm	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screw, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ⅜ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in. inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in. inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in. inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in. inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$2.50 to $2.75
Foundry, f.o.b. Connellsville Prompt	3.25 to 4.50
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	8.26
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal (Nominal)

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $2.00
Mine run coking coal f.o.b. W. Pa.	1.75 to 2.25
Gas coal, ¾-in., f.o.b. Pa mines	2.00 to 2.50
Mine run gas coal, f.o.b. Pa. mines	2.00 to 2.25
Steam slack, f.o.b. W. Pa. mines	85c. to 1.00
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.25

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.23c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.25c.
No. 4 industrial	5.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$43.40 to $44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	38.30
4-in., del'd New York	41.30
6-in., and larger, Birmingham,	$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00

Class "A" and gas pipe, $3 extra

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton f.o.b. Valley furnace:

Basic	$16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	16.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, copper free	25.00
Silvery, sil. 8 per cent	28.17
Bess. ferrosil'n, 15 per cent	38.67

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.00
Del'd St. Louis	17.85
Malleable, f.o.b. Granite City	17.50
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	17.35

Freight rates, 83c (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'v'd eastern N. J.	$18.02 to $19.02
*Buffalo malleable, del'v'd eastern N. J.	18.52 to 19.52
East Pa. No. 2 fdy. del'v'd eastern N. J.	18.02 to 18.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

BUFFALO

Per gross ton, f.o.b. furnace:

*No 2 fdy.	$17.00
Malleable, sil. up to 2.25	17.50
Basic	15.00
Lake Superior charcoal, del'd	23.41

*Each increase of 25 points of silicon above base foundry grade takes 25c. extra.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$17.73
Tenn. fdy., sil. 1.75 to 2.25	17.73
N'th'n No. 2 foundry	$18.13 to 19.32
S'th'n Ohio silvery, 8%	25.14

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy.	$16.50
Malleable	16.50
Ohio silvery, 8 per cent	26.25
Stand. low. phos., Valley	25.00
Southern No. 2 fdy.	17.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

*East. Pa. No. 2	$17.34
Basic (del'd east Pa.)	17.09
Malleable	17.84
Stand. low phos. (f.o.b east. Pa. furnace)	$22.00 to $23.00
Con. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

*Each increase of 25 points of silicon above base grade takes 25c extra.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$13.00
Basic	13.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:

Mystic, sil. 1.75 to 2.25	$18.50
Buffalo, sil. 1.75 to 2.25	18.50
Ala., sil. 1.75 to 2.25	18.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carloads)	$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
6%	$21.25	12%	$28.25
7%	22.25	13%	29.75
8%	23.25	14%	31.25
9%	24.25	15%	32.75
10%	25.25	16%	34.25
11%	26.75	17%	35.75

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
10%	$26.25	14%	$32.25
11%	27.75	15%	33.75
12%	29.25	16%	35.25
13%	30.75	17%	36.75

Manganese 1½ to 3%. $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.65% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to 2.80
Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c.
Iron, low phos., Swedish, average 68½% iron	8.50c.
Iron, basic or foundry, Swedish, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 65% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	22c.
Manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 49-51%	21c.
Manganese, Brazilian, 46 to 48%	17c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid*	$12.00
Tungsten, domestic scheelite*	$11.00 to $12.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$14.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.90
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.50 to $14.00
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	13.50 to 14.00
Scrap rails	13.50 to 14.00
Rails 3 ft. and under	15.50 to 16.00
Sheet bar crops, ordinary	14.50 to 15.00
Compressed sheet steel	13.00 to 13.50
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	12.00 to 12.50
Machine shop turnings	10.50 to 11.00
Short shov. steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Cast iron carwheels	13.00 to 13.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.50 to 12.00
Rail'r. knuckles and couplers	15.50 to 16.00
Rail, coil and leaf springs	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Low phos. billet crops	17.00 to 17.50
Low phos. sheet bar crops	15.50 to 16.00
Low phos. plate scrap	15.00 to 15.50
Low phos. punchings	15.50 to 16.00
Steel car axles	16.00 to 16.50
Hydraulic comp. sheets	$8.50 to $9.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.75 to 9.25
Rolled carwheels	11.50 to 12.00
Railroad tires	11.25 to 12.25
Railroad leaf springs	11.50 to 12.00
Axle turnings	8.50 to 9.00
Steel couplers and knuckles	11.00 to 11.50
Coil springs	11.75 to 12.25
Axle turnings (elec. fur.)	8.50 to 9.00
Low phos. punchings	12.00 to 12.50
Low phos. plates, 12 in. and under	12.00 to 12.50
Cast iron borings	6.50 to 7.00
Short shoveling turnings	6.50 to 7.00
Machine shop turnings	6.00 to 6.50
Rerolling rails	12.00 to 12.50
Steel rails, less than 3 ft.	11.75 to 12.25
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars steel	11.50 to 12.00
Cast iron carwheels	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	8.50 to 9.00

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.00 to $10.50
Shoveling steel	10.00 to 10.50

	Per Net Ton
Iron car axles	$12.50 to $13.00
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	9.00 to 9.50

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No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	4.75 to	5.25
No. 1 machinery cast	10.50 to	11.00
Clean automobile cast	10.00 to	10.50
No. 1 railroad cast	10.00 to	10.50
No. 1 agricultural cast	8.75 to	9.25
Stove plate	7.75 to	8.25
Grate bars	6.75 to	7.25
Brake shoes	9.75 to	10.25

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel		$12.00
No. 2 heavy melting steel	$10.00 to	10.50
No. 1 railroad wrought		12.00
Bundled sheets	8.50 to	9.00
Hydraulic compressed, new	10.50 to	11.00
Hydraulic compressed, old	8.50 to	9.00
Machine shop turnings		8.00
Heavy axle turnings	10.00 to	10.50
Cast borings		7.00
Heavy breakable cast	10.00 to	10.50
Stove plate (steel works)		9.50
No. 1 low phos. heavy		15.00
Couplers and knuckles		14.00
Rolled steel wheels		14.00
No. 1 blast furnace		7.00
Spec. iron and steel pipe	10.00 to	10.50
Shafting	15.00 to	15.50
Steel Axles	15.00 to	15.50
No. 1 forge fire		10.50
Cast iron carwheels	12.50 to	13.00
No. 1 cast	12.00 to	13.00
Cast borings (chem.)	10.00 to	10.50
Steel rails for rolling	12.00 to	12.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.00 to	$11.25
No. 2 heavy melting steel	10.50 to	10.75
Compressed sheet steel	10.00 to	10.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	10.00 to	10.50
Machine shop turnings	7.50 to	8.00
Short shoveling turnings	8.00 to	8.50
No. 1 busheling	10.00 to	10.50
Steel axle turnings	7.50 to	8.00
Low phos. billet crops	12.50 to	13.00
Cast iron borings	7.75 to	8.25
Mixed borings and short turnings	7.75 to	8.25
No. 2 busheling	7.75 to	8.00
No. 1 cast	11.00 to	11.50
Railroad grate bars	6.50 to	7.00
Stove plate	7.50 to	8.00
Rails under 3 ft.	10.00 to	10.50
Rails for rolling	10.50 to	11.00
Railroad malleable	10.00 to	10.50
Cast iron carwheels		11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.50 to	$11.00
No. 2 heavy melting scrap	10.00 to	10.50
Scrap rails	8.75 to	9.25
New hydraul. comp. sheets	10.00 to	10.50
Old hydraul. comp. sheets	9.50 to	10.00
Drop forge flashings	10.00 to	10.50
No. 1 busheling	10.00 to	10.50
Hvy. steel axle turnings	8.50 to	9.00
Machine shop turnings	7.50 to	8.00
Knuckles and couplers	11.50 to	12.00
Coil and leaf springs	11.50 to	12.00
Rolled steel wheels	11.50 to	12.00
Low phos. billet crops	12.50 to	13.00
Short shov. steel turnings	7.50 to	8.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
No. 2 busheling	6.00 to	6.50
Steel car axles	11.00 to	12.00
Iron axles	11.00 to	12.00
No. 1 machinery cast	11.25 to	12.25
No. 1 cupola cast	11.00 to	12.00
Stove plate	8.75 to	9.25
Steel rails, 3 ft. and under	13.50 to	14.00
Cast iron carwheels	10.00 to	10.50
Industrial malleable	11.50 to	12.00
Railroad malleable	12.00 to	12.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel		$11.00
Scrap steel rails		10.00
Short shoveling turnings		5.50
Stove plate	$7.00 to	7.50
Steel axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 railroad wrought	7.00 to	7.50
Rails for rolling		11.50
No. 1 cast		10.50
Tramcar wheels		10.00
Cast iron borings, chem.		8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.75 to	$10.25
No. 1 heavy melting	9.00 to	9.50
No. 2 heavy melting	8.25 to	8.75
No. 1 locomotive tires	7.50 to	8.00
Misc stand.-sec. rails	10.00 to	10.50
Railroad springs	10.00 to	10.50
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	9.00 to	9.50
No. 1 busheling	4.75 to	5.25
Cast iron borings and shoveling turnings	3.50 to	4.00
Rails for rolling	10.50 to	11.00
Machine shop turnings	3.50 to	4.00
Heavy turnings	4.75 to	5.25
Steel car axles	10.00 to	10.50
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	9.50 to	10.00
No. 1 railroad wrought	6.50 to	7.00
Steel rails less than 3 ft.	11.50 to	12.00
Steel angle bars	10.00 to	10.50
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	8.50 to	9.00
Railroad malleable	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Stove plate	7.00 to	7.50
Relay rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	6.00 to	6.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.00 to	$7.50
Scrap T rails	6.75 to	7.25
Machine shop turnings	4.00 to	4.25
Cast iron borings	4.00 to	4.25
Bundled skeleton, long	5.50 to	6.00
Forge flashings	4.75 to	5.00
Blast furnace scrap	4.75 to	5.00
Shafting	9.00 to	9.50
Steel car axles	8.50 to	9.00
Wrought pipe	3.50 to	4.00
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	10.00 to	10.50

Per gross ton delivered consumers' yards:

Textile cast	$10.00 to	$10.25
No. 1 machinery cast	10.00 to	10.25
Stove plate	6.25 to	6.50
Railroad malleable	11.00 to	12.00

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$8.00 to	$8.25
No. 2 heavy melting steel	6.75 to	7.00
Heavy melting steel (yard)	4.00 to	4.50
No. 1 heavy breakable cast	6.50 to	6.75
Stove plate (steel works)	5.25 to	6.00
Machine shop turnings	4.00 to	4.50
Short shoveling turnings	4.00 to	4.50
Cast borings	4.00 to	4.25
No. 1 blast furnace	4.00 to	4.25
Steel car axles	10.00 to	10.50
Spec. iron and steel pipe	$4.50 to	$5.00
Forge fire	5.50 to	6.00
No. 1 railroad wrought	6.50 to	7.00
No. 1 yard wrought, long	4.50 to	5.00
Rails for rolling	7.50 to	8.00
No. 1 cast	6.50 to	7.00
No. 2 cast	5.50 to	6.50
Stove plate (foundry)	6.00 to	6.50
Cast borings (chemical)	6.50 to	7.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$11.00
No. 1 hvy. cast (cupola size)	9.00
No 2 cast	7.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$9.50 to	$10.00
Scrap rails for melting	9.25 to	9.75
Loose sheet clippings	5.00 to	5.50
Bundled sheets	6.00 to	6.50
Cast iron borings	6.00 to	6.50
Machine shop turnings	5.50 to	6.00
No. 1 busheling	7.00 to	7.50
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.75 to	10.25
No. 1 locomotive tires	8.50 to	9.00
Short rails	11.50 to	12.00
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	9.50 to	10.00
No. 1 railroad cast	9.00 to	9.50
Burnt cast	7.00 to	7.50
Stove plate	7.00 to	7.50
Agricultural malleable	8.75 to	9.25
Railroad malleable	9.25 to	9.75

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$9.00 to	$9.50
Borings and short turnings	6.75 to	7.25
Long turnings	6.00 to	6.50
No. 1 machinery cast	8.50 to	9.00
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	9.25 to	9.75
Stove plate	6.00 to	6.50
New factory busheling	7.75 to	8.25
Old No. 2 busheling	5.75 to	6.25
Sheet clippings	6.25 to	6.75
Flashings	7.00 to	7.50
Low phos. plate scrap	10.25 to	10.75

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails, scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.50c.
Hot-rolled sheets (No. 10)	2.50c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.25
Wire, black, soft ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.45
Cement coated nails, per keg	2.45

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.75c. to 1.90c.
Rail steel reinforcement	1.50c. to 1.65c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.25c.
Flats and squares	3.25c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	2.85c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg lots)	3c.
Rivets, boiler (keg lots)	3c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.45
Com. wire nails, base per keg	2.55
Cement c't'd nails, base per keg	2.55

NEW YORK

	Base per lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.10c.
Iron bars, swed. charcoal	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.70c.
Flats and squares	4.20c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ⅛ x ⅛ in. and larger; Smooth finish, 1 to 2½ x ¼ in. and larger	3.40c. 3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.90
	Per Cent Off List
Machine bolt, cut thread: ¾ x 6 in. and smaller; 1 x 30 in. and smaller	.65 to 65 and 10 .65 to 65 and 10
Carriage bolts, cut thread: ⅛ x 6 in. and smaller; ¾ x 20 in. and smaller	.65 to 65 and 10 .65 to 65 and 10
	Per 100 Ft.
Boiler tubes: Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
Black corrug. sheets (No. 24)	3.65c.
Galv. corrug. sheets	4.05c.
Structural rivets	3.00c.
Boiler rivets	3.00c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller, 100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.60c.
*Structural shapes	2.60c.
*Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.60c.
*Steel hoops	3.15c.
*Steel bands, No. 12 to 3/16 in., incl.	2.90c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.30c.
†Galvanized sheets (No. 24)	3.75c.
*Hot-rolled annealed sheets (No. 10)	2.75c.
Diam. pat. floor plates, ¼ in.	4.35c.
Swedish iron bars	6.00c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 2.35c.
Cold-fin. steel bars: Rounds, squares, hexagons	3.25c.
Flats	3.40c.
Flat rolled steel under ¼ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.75c.
Bands	3.20c.
Cold-finished bars	3.32c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.15c.
Hot-rolled sheets (No. 10)	3.05c.
Structural rivets	4.00c.
Small rivets	.60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	6.00
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galv. sheets (No. 24)	4.00c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled unannealed sheets	3.10c.
Com. wire nails, base per keg	$2.75
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	2.60c.
*H beams and shapes	2.60c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	2.60c.
*Floor plates, diamond pattern	4.50c.
*Bar and bar shapes (mild steel)	2.50c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.50c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, half ovals, ovals and bevels	3.75c.
Tire steel, rd. edge 1½ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	2.45c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

Base prices for 40,000 lb. orders; extras apply for smaller quantities.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	3.35c.	3.30c.	3.15c.
Shapes, standard	3.35c.	3.30c.	3.15c.
Wide-flanged beams and columns	3.45c.	3.45c.	3.50c.
Soft steel bars	3.35c.	3.30c.	3.15c.
*Reinforcing bars	2.90c.	3.00c.	3.15c.
Hot-rolled annealed sheets (No. 24)	4.15c.	4.05c.	4.50c.
Hot-rolled sheets (No. 10)	3.53c.	3.45c.	3.75c.
Galv. sheets (No. 24)	4.75c.	4.65c.	5.00c.
*Struc. rivets, ½ in. and larger	5.75c.	6.00c.	5.25c.
less than 100 lb.			
*Cold finished steel Rounds	5.85c.	5.85c.	5.75c.
Squares and hexagons	7.10c.	7.10c.	7.00c.
Flats	7.60c.	7.60c.	8.00c.
Common wire nails —base per keg	$2.80	$2.90	$2.70
less carload			

*Subject to deductions for quantity.

Courtesy of Muskegon Motor Specialty Co., Jackson, Michigan.

OPERATION: SURFACE AND STRADDLE MILLING, CRANKSHAFT COUNTERWEIGHT PADS.
MACHINE: DEVLIEG NO. 30 SUPERMIL.
MATERIAL: 1045 STEEL.
STOCK REMOVAL: 3/16 INCH PER PAD.
PRODUCTION: 17 PER HOUR.
LUBRICANT: 1 PART SUNOCO TO 30 PARTS WATER.

Courtesy of Muskegon Motor Specialty Co., Jackson, Michigan.

OPERATION: FINISH GRIND CRANKSHAFT CENTER MAIN BEARING—PLUNGER CUT.
MACHINE: LANDIS GRINDER.
MATERIAL: H. R. TYPE "EE" STEEL.
SPINDLE SPEED: 750 R.P.M.
WHEEL SIZE: 2.188 INCH FACE, 30 INCH DIAMETER.
STOCK REMOVAL: 25 THOUSANDTHS OF AN INCH.
PRODUCTION: 40 PER HOUR.
COOLANT: 1 PART SUNOCO TO 60 PARTS WATER.

Increased Production with *LOWER* operating costs

. . . *accuracy and finish Maintained*

UNDER today's operating conditions, the fullest efficiency of machine tools is of greater importance than ever. Speed of production, with close tolerances and excellent finish (and *all* with economy) are prime factors.

Sunoco Emulsifying Cutting Oil is a dependable, proven, widely-used coolant and lubricant with which to secure the utmost from machine tool equipment. Its superior qualities make it ideally suited for present day machine tool schedules.

With Sunoco, lost time due to frequent tool re-sharpening is decreased, deeper and faster cuts are made possible, work is kept cooler, production increased, machines and finished parts are protected from rust and corrosion—and systems require cleaning out and replenishing less frequently.

Sunoco has been chosen by leaders in the industry after exhaustive tests of all factors that contribute to machine tool efficiency.

A trial is suggested in your plant, too, and our experienced engineers are at your service.

SUN OIL COMPANY, PHILADELPHIA, PA., U.S.A.

SUNOCO

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CUTTING OIL

Made by the producers of BLUE SUNOCO MOTOR FUEL

NRA MEMBER U.S. WE DO OUR PART

Akron, Albany, Allentown, Atlantic City, Baltimore, Battle Creek, Beaumont, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Detroit, Flint, Grand Rapids, Harrisburg, Jackson (Mich.), Jacksonville, Miami, Newark, New York, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Scranton-Wilkes Barre, Syracuse, Tampa, Toledo, Trenton, Wilmington, Youngstown.

Subsidiary Companies:

Sun Company . . . Tulsa Sun Oil Co., Ltd., . . . Montreal and Toronto British Sun Oil Co., Ltd., . . . London, England.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Continental Can Co., 1 Pershing Square, New York, let general contract to Austin Co., Seattle, for new three-story plant at Seattle. Cost about $140,000 with equipment.

ECK Electric Mfg. Corpn., New York, has been organized under direction of Harry A. Gottlieb, 32 Broadway, representative, to manufacture electrical machinery and appliances.

Todd Shipyards Corpn., 25 Broadway, New York, will begin work at once on new ship repair and drydock in Houston ship channel, Houston, Tex., comprising three floating drydocks, three piers, group of one-story shops for metal-working, wood-working, electrical and other construction and repair departments. Company has arranged financing for $1,100,000 for initial plant; entire project will cost about double that sum. Frederick Harris is chief engineer.

American Cyanamid Co., 535 Fifth Avenue, New York, through its subsidiary, Calco Chemical Co., Bound Brook, N. J., has purchased chemical works and business of E. C. Klipstein & Sons Co., South Charleston, W. Va., for price of about $1,000,000, and will operate as new subsidiary.

Berst-Forster-Dixfield Co., 410 Lexington Avenue, New York, manufacturer of pulp and wood products, has let general contract to James Leck Co., 211 South Eleventh Street, Minneapolis, for three-story addition, 100 x 106 ft., to branch plant at Cloquet, Minn. Cost over $70,000 with equipment. Homan F. Hallock, Oswego, N. Y., is architect and engineer.

Sunlfe Rapid Cutter, Inc., Brooklyn, has been organized by George B. Hoehner, 145 Schench Avenue, and associates, to manufacture edge tool and other hardware specialties.

Jacob Ruppert Corpn., 1639 Third Avenue, New York, let general contract to William Kennedy Construction Co., 215 Montague Street, Brooklyn, for first unit of new multistory brewing plant addition, adjoining present brewery. Cost over $750,000 with equipment. Other units will be built later. Ely Jacques Kahn, 2 Park Avenue, New York, is architect.

American Commercial Alcohol Corpn., 405 Lexington Avenue, New York, will carry out expansion and modernization program at distilling plant at Pekin, Ill., to include new equipment. Cost about $100,000 with machinery.

Southern Alkali Corpn., an interest of American Cyanamid Co., 535 Fifth Avenue, New York, and Columbia Chemical Co. division of Pittsburgh Plate Glass Co., Barberton, Ohio, has approved plans for one-story plant for manufacture of steel drums at new alkali works at Corpus Christi, Tex., for shipping plant products. Cost over $75,000 with equipment. Entire plant will cost about $5.000,000. H. K. Ferguson Co., Hanna Building, Cleveland, is engineer.

Royal Battery Corpn., Jersey Avenue, New Brunswick, N. J., let general contract for one-story addition for electric storage battery manufacture to C. S. Rollerson, Inc., 400 Watchung Avenue, Plainfield, N. J. Cost about $25,000 with equipment.

Ferro Pipe & Foundry Co., Vineland, N. J., has been organized by Carlton A. Down and Thomas G. Tuso, Vineland National Bank & Trust Co. Building, capital $100,000, to manufacture cast iron pipe, fittings, etc.

Passaic Valley Sewerage Commission, 20 Branford Place, Newark, N. J., plans new sedimentation basins at sewage disposal works on Newark meadows, with pumping machinery, pipe lines, etc. Cost over $700,000 with equipment. Financing is being arranged.

Federal Shipbuilding & Drydock Co., Kearny, N. J., plans increase in production schedule and will add about 1000 men to working force. Company has secured contract for two 1500-ton destroyers for Government, each to cost $3,410,800.

Century Stearic Acid Works, Inc., Orthodox Street and Delaware River, Philadelphia, plans rebuilding part of plant recently destroyed by fire. Loss over $50,000 with equipment.

Penn Galvanizing Co., 1114 North Front Street, Philadelphia, has leased one-story building at 2201 East Tioga Street, formerly used as a foundry for new plant.

Peerless Brewing Co., Philadelphia, recently organized, has let general contract to John Bantel, 923 North Eighth Street, for extensions and improvements in plant on Orianna Street. New units will be built. Cost over $85,000 with equipment. William F. Koelle & Co., 1633 Race Street, are architects and engineers.

Constructing Quartermaster, Air Depot, Middletown, Pa., will secure appropriation of $78,750 for extensions and improvements in electrical, water and railroad systems, including new equipment, and will soon ask bids.

Board of Trustees, State Institution for Feeble Minded, Stockley, Del., plans installation of new water supply system and sewage disposal plant, including pumping machinery, pipe lines, etc. Appropriation of $162,020 has been authorized for this and other work.

SOUTHWEST

Midwest Brewing Co., Eighteenth Street and Agnes Avenue, Kansas City, Mo., has plans for new eight-story and basement plant, with boiler house adjoining. Cost over $200,000 with equipment. A. B. Anderson, Davidson Building, is architect. George Wentzel, last noted address, is engineer.

City Council, Blackwell, Okla., plans installation of pumping machinery, valves and other equipment, pipe lines, etc., for extensions and improvements in municipal waterworks. Cost about $150,000. Financing is being arranged. N. A. Stoldt is city engineer.

City Council, Washington, Kan., plans new municipal electric light and power plant. Cost about $88,000 with equipment. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Marth Brewing Corpn., St. Louis, recently organized by H. C. Marth, 5114 Enright Avenue, and associates, has taken over former Phoenix Brewery, 1714 South Eighteenth Street, and will expand and modernize, including installation of new equipment. Cost about $200,000 with machinery.

State Highway Commission, State Capitol Building, Oklahoma City, Okla., Edward McDonald, secretary, has plans for one-story equipment storage and distributing plant, 50 x 100 ft., at Buffalo, Okla. Joseph I. Davis, address noted, is architect.

Common Council, Wellington, Kan., will soon take bids for pumping machinery and other equipment for new municipal sewage disposal works. Cost about $75,000 with machinery. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Bailor Mfg. Co., Atchison, Kan., W. C. O'Brien, head, plans extensions and improvements in commercial alcohol plant, including addition. Cost over $50,000 with equipment. E. H. Gill, Fairfax Building, Kansas City, Mo., is engineer.

Houston American Brewing Co., Houston, Tex., has taken over former American Brewery, near Main Street viaduct, and will carry out modernization and expansion, to include new equipment. Cost about $300,000 with machinery. Rex D. Frazier and George Pruter head new company.

Humble Oil & Refining Co., Houston, Tex., is considering new bulk oil storage and distributing plant in oil field district near Bastrop, Tex. Cost about $70,000 with equipment.

Beverage Cooler Corpn., Dallas, Tex., has been organized by George T. Sprau, 2422 Alamo Street, and associates, to manufacture liquid coolers and kindred equipment.

WESTERN PENNA.

Schenley Products Co., Clark Building, Pittsburgh, distiller, has plans for expansion and modernization in former George T. Stagg Distillery, Frankfort, Ky., recently acquired, to include new equipment. Similar program will be carried out at former James E. Pepper Distillery, Lexington, Ky., also lately taken over, including erection of new main distilling unit. Entire project will cost over $250,000 with machinery. Carl J. Kiefer, Schmidt Building, Cincinnati, is engineer.

McDaniel Refractory Porcelain Co., Beaver Falls, Pa., manufacturer of pyrometer tubes and kindred precision products, plans rebuilding kiln house and other departments recently destroyed by fire. Loss about $30,000 with equipment.

Crescent Brewing Co., Tarr, near Jeannette, Pa., will carry out expansion and improvements, beginning work at once. New equipment will be installed. Cost about $75,000 with machinery.

Bessemer & Lake Erie Railroad Co., Pittsburgh, is increasing operations at locomotive and car shops at Greenville, Pa., and has recalled over 800 men during August.

Board of Public Works, Wheeling, W. Va., plans installation of pumping machinery and other equipment for new municipal sewage system. Cost over $3,000,000. J. N. Chester Engineers, Inc., Clark Building, Pittsburgh, is consulting engineer. Financing will be arranged soon.

MIDDLE WEST

Hiram Walker & Sons, Inc., Union Guardian Building, Detroit, a subsidiary of Hiram Walker-Gooderham & Worts, Ltd., Walkerville, Ont., distiller, has asked bids on general contract for new plant on 15-acre tract recently acquired at Peoria, Ill., to include power house, machine shop and other structures. Cost over $1,000,000 with equipment. William J. Hume is president of both companies.

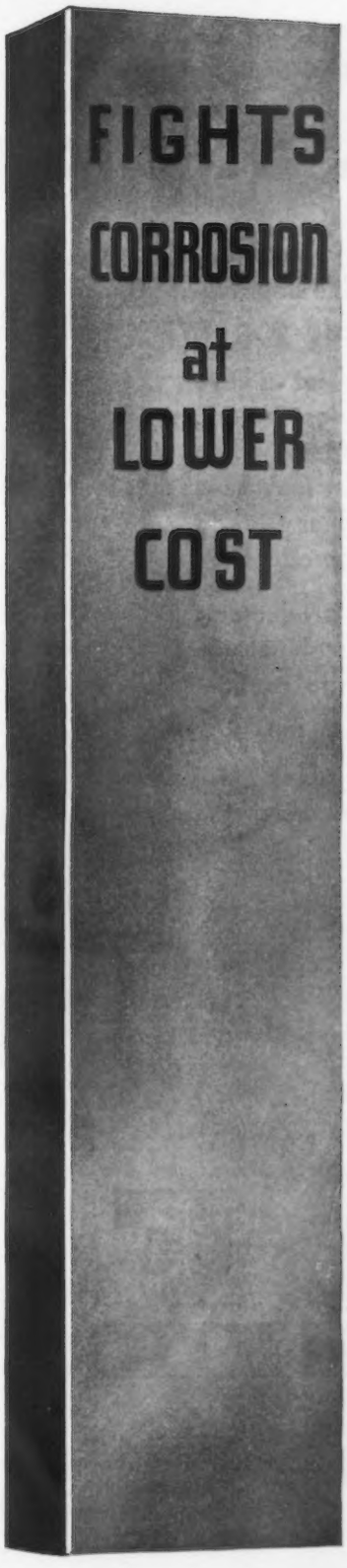
Charpier Valve Co., 1404 West 103rd Street, Chicago, has been organized by Vernon, Leonard and Walter Charpier, Chicago, to manufacture valves and kindred mechanical specialties.

Royal Brewing Co., Elston Avenue and Snow Street, Chicago, recently chartered, has taken over former Brand Brewery, location noted, and will expand and modernize, to include installation of new equipment. Cost about $200,000 with machinery. Royal company will be an interest of Brewery & Distillery Securities Corpn., New York, recently formed with capital of $1,000,000.

City Council; Webster City, Iowa, G. J. Long, city manager, is planning extensions and improvements in municipal gas plant and electric light and power plant, including a machine shop at last noted works. Cost about $50,000, including new 50,000-cu. ft. gas holder. Financing is being arranged.

Fleischmann Malting Co., 301 Erie Street, Minneapolis, has plans for two new units, 65 x 270 ft. and 60 x 100 ft. Cost over $80,000 with equipment. Contract has been let to R. J. Kuehn Construction Co., 621 South Third Street, for new grain elevator at 1001 Delaware Street, S.E. Cost over $85,000

USS PLYKROME



● Here at last is an effective steel for combating corrosion at low cost. For Plykrome costs only half as much as solid Stainless Steel, yet it is just as effective in any application in which corrosion resistance is required only on one side.

Plykrome is thoroughly tested. Its patented method of production precludes the possibility of any separation of the Stainless Steel veneer from the base plate.

Plykrome may be fabricated by any of the usual methods without special equipment.

For further information and advice on the application of Plykrome to specific installations, write to the Illinois Steel Company.

USS STEEL

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SUBSIDIARY OF
UNITED STATES STEEL CORPORATION

U S S CHROMIUM-NICKEL ALLOY STEELS ARE PRODUCED UNDER LICENSES OF THE CHEMICAL FOUNDATION, INC., NEW YORK, AND FRIED. KRUPP A. G. OF GERMANY

with screening, processing, conveying and other equipment.

J. Fred Smith, 293 Stephenson Street, Freeport, Ill., has plans for expansion and modernization in three-story brewery, 40 x 350 ft., including new equipment. Cost about $75,000 with machinery. J. E. Siebel Sons Co., 960 Montana Street, Chicago, are consulting engineers.

United Coin Machine Mfg. Co., Room 1601, 69 West Washington Street, Chicago, has been organized by Benjamin Weiss and associates, to manufacture vending machines and parts.

Common Council, Winfield, Iowa, is arranging fund of $65,000 for new municipal electric light and power plant. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Fred Krug Brewing Co., Twenty-fifth Street and Deer Park Boulevard, Omaha, Neb., has approved plans for extensions and improvements, including additional equipment. Cost about $200,000 with machinery.

◀ BUFFALO DISTRICT ▶

Constructing Quartermaster, Fort Niagara, N. Y., will secure apropriation of $152,336 for extensions and improvements in water and sewer systems with equipment and pipe lines, electric lighting system, etc. Bids will be asked soon.

Danahy Faxon Stores, Inc., 30 Elk Street, Buffalo, meat and food packer and distributer, has let general contract to John W. Cowper, Inc., Rand Building, for new four-story storage and distributing plant. Cost over $200,000 with equipment.

Rochester Engineering & Centrifugal Corpn., Rochester, N. Y., recently organized with capital of $100,000, will be operated as a subsidiary of American Laundry Machinery Co., Buffalo Road, with headquarters at Norwood, Cincinnati, and will specialize in production of machinery and appliances for textile, chemical and allied industries.

◀ SOUTH CENTRAL ▶

Tennessee-Eastman Corpn., Kingsport, Tenn., manufacturer of cellulose products, has plans for four-story addition to power plant, 65 x 85 ft. Cost over $65,000 with equipment. Company is a subsidiary of Eastman Kodak Co., Rochester, N. Y.

Paul J. Kingston, 638 Goodwyn Institute Building, Memphis, Tenn., is at head of project to establish local brewery. Property is being acquired and will be remodeled and addition erected. Cost over $200,000 with equipment. Company will be organized. Murray Johnson, address noted, is company architect.

Chattanooga Brewing Co., Chattanooga, Tenn., recently organized by Charles Reif, 219 Poplar Street, and associates, capital $500,000, has plans for new two-story and basement plant on Bissell Street. Cost over $85,000 with equipment. R. H. Hunt, James Building, is architect.

City Council, Sylacauga, Ala., plans installation of pumping machinery and other equipment, pipe lines, etc., for new municipal waterworks. Cost about $100,000 with equipment. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

◀ NEW ENGLAND ▶

Yale Brewing Co., 740 Main Street, Hartford, Conn., A. C. Wagner, president, has asked bids on general contract for one and one-half story addition, 118 x 500 ft., one-story boiler plant and refrigerating plant. Cost over $100,000 with equipment.

Remington Arms Co., Bridgeport, Conn., a subsidiary of E. I. duPont de Nemours & Co., Wilmington, Del., has taken over plant and property of Chamberlain Cartridge & Target Co., Findlay, Ohio, manufacturer of firearm specialties for sportsmen, and will operate as an affiliated interest.

E. J. Perry Machinery Corpn., New Bedford, Mass., has been organized by Emanuel J. Perry, 184 Bedford Street, and associates, capital $50,000, to manufacture machinery and parts.

Abrasive Products, Inc., Poydras Street, Mattapan, Boston, manufacturer of sandpaper and other abrasive products, has acquired

State Hospital
Wingdale, N. Y.

NRA MEMBER U.S.
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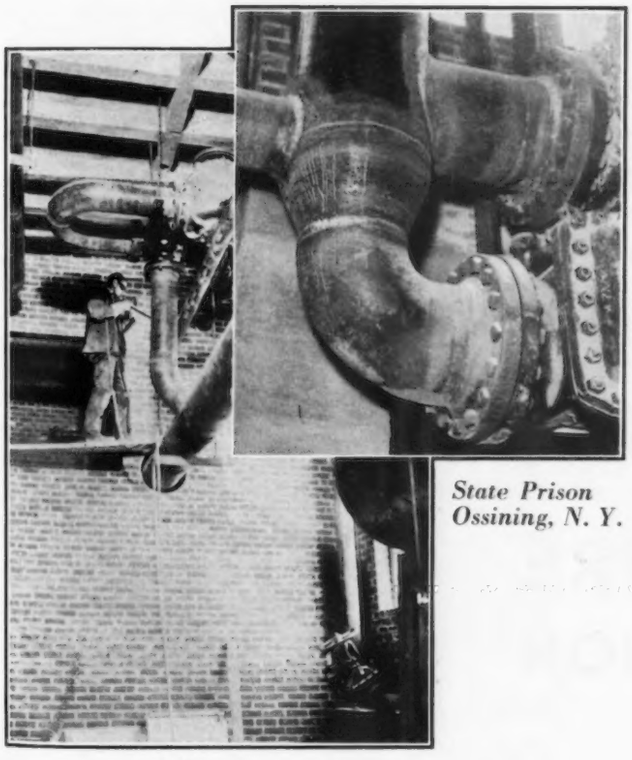
All Heating and Power Piping in these modern Power Plants is AIRCOWELDED . . .

These modern power plants recently erected by the State of New York are splendid examples of 100 percent AIRCO jobs. Steam heating and power piping were AIRCOWELDED throughout with AIRCO oxygen, acetylene, apparatus and supplies. Piping contractor on both jobs was the CHIPPEWA PLUMBING CO., Inc., of Buffalo, N. Y.

As usual, AIRCOWELDING made good in every respect, easily satisfying the State's rigid specifications and inspections.

When it comes to the welding of pipe with maximum speed, soundness and economy the outstanding process is AIRCOWELDING.



State Prison
Ossining, N. Y.

WRITE for these BULLETINS

AIRCOWELDING FOR PIPE LINES *— gives full details of the AIRCOWELDING process, shows why it is faster and more economical, and includes laboratory and field test results.*

PIPING—TAILORED TO FIT *—makes clear the overwhelming advantages of welded piping for buildings of every type and size and gives valuable data on methods and equipment.*

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District Offices and Distributing Stations in Principal Cities

Airco Oxygen—Airco Acetylene—Supplies—National Carbide Airco-Davis-Bournonville Welding and Cutting Apparatus
Oxygen and Acetylene Plants conveniently located thruout the country and in all cities having District Offices

A NATION-WIDE WELDING SUPPLY SERVICE

five-story factory, 96,000 sq. ft. floor space at South Braintree, Mass. Present works will be removed to new location and additional equipment installed.

D. R. Campbell Machine Co., 55 Mildred Avenue, Mattapan, Boston, manufacturer of floor machines and parts, has let general contract to C. C. Temple Co., 2 Park Square, for two-story and basement addition, 40 x 94 ft. Cost about $25,000 with equipment.

Wire Co. of Rhode Island, Inc., East Providence, R. I., has been organized by Joseph G. Riesman, 2 Hinckley Road, Milton, Mass., and associates, to manufacture wire and wire goods.

SOUTH ATLANTIC

Board of Public Works, Fort Pierce, Fla., plans improvements in municipal electric light and power plant and distribution system, including new equipment, to replace recent loss by storm. Fund of $36,000 authorized for work.

Constructing Quartermaster, Fort McPherson, Ga., has secured appropriation of $188,749 for extensions and improvements in water, sewer and gas systems, electrical system, heating system, etc., with pipe lines and equipment, and plans early call for bids; also, $20,000 for new radio transmitter building.

Comer-Kimmel Machinery Co., 3 Ivy Street, Atlanta, Ga., has been organized by Benjamin T. Comer and Lyon Kimmel, Atlanta, to manufacture machinery and parts.

Gulf Refining Co., Atlanta, Ga., will soon begin erection of new bulk oil storage and distributing plant on site, 158 x 400 ft., on North Indian River, New Smyrna, Fla., including steel tanks, etc. Cost about $35,000 with equipment.

Fette Brewing Co., Inc., Tampa, Fla., recently organized by F. J. Fette, P. O. Box 464, and associates, plans new brewery on local site. Cost over $100,000 with equipment.

MICHIGAN DISTRICT

Ternstedt Mfg. Co., 6307 West Fort Street, Detroit, manufacturer of automobile hardware, has let general contract to Barton Malow Co., 1900 East Jefferson Street, for new one-story addition. Cost close to $35,000 with equipment.

Texas Co., 1601 East Grand Boulevard, Detroit, with headquarters in New York, has purchased 25-acre tract in River Rouge district, for new bulk oil storage and distributing plant. Cost about $100,000 with steel tanks, pumping plant and other equipment. Later plant will be enlarged with total investment of about $250,000.

Parsons & Lamb Mfg. Co., Inc., Pontiac, Mich., has been organized by John H. Parsons, Bloomfield Hills, Mich., and associates, capital $50,000, to manufacture machinery and parts.

Isabella Sugar Co., Mount Pleasant, Mich., plans one-story addition, 55 x 75 ft., for manufacture of commercial fertilizers. Cost about $25,000 with equipment. William Stone, Saginaw, Mich., is architect.

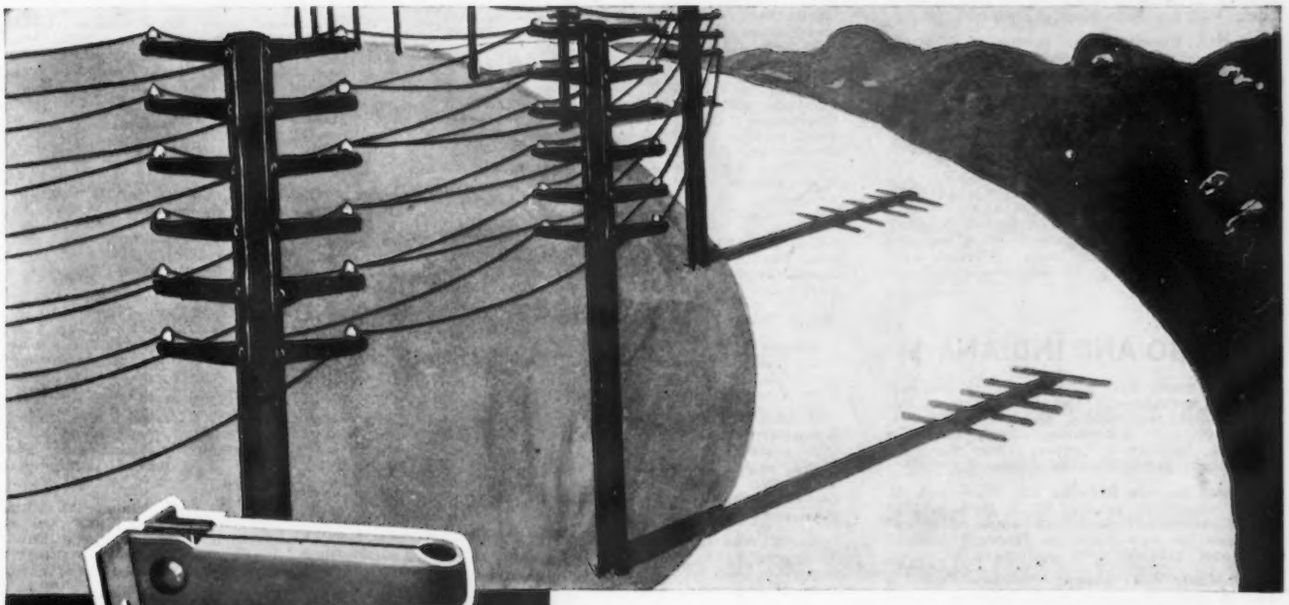
WASHINGTON DISTRICT

B. H. Hubbert & Sons, 3603 East Pratt Street, Baltimore, manufacturer of copper kettles, copper coils and kindred products, plans new two-story plant, 75 x 100 ft., for manufacture of brewing and distilling equipment. Cost about $30,000 with equipment. Other units will be built later. B. H. Hubbert is general manager.

Department of Interior, Interior Building, Washington, asks bids until Aug. 29 for three 750-hp. boilers with superheaters, instruments, etc.; three stokers with forced-draft equipment and pressure control apparatus, coal storage and coal-handling equipment, ash-handling equipment, two centrifugal boiler feed pumps, feed-water heater and accessory equipment for power plant at local St. Elizabeth Hospital.

Town Council, Stanley, Va., plans purchase of motor-driven deep well pumping equipment, 75,000-gal. elevated steel tank, on 100-ft. steel tower, galvanized pipe, etc., for municipal water system.

Town Council, Culpeper, Va., V. von Gemmingen, town manager, asks bids until Aug.



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12 GAUGE STEEL

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Crosby has played a leading part in the evolution of the stamping to its present high standard, and whatever you require in pressed metal can be expeditiously produced by Crosby. Our suggestions and helpful cooperation born of long experience assure you of the correct stamping for your particular job at a fair price.

THE CROSBY COMPANY

General Offices and Works: Buffalo, N. Y.

BRANCH OFFICES

Chicago Detroit Cleveland New York Philadelphia Pittsburgh

28 for new electric distributing system, including equipment. Wiley & Wilson, Lynchburg, Va., are consulting engineers.

Liberty Brewing Co., Boston and Ponca Streets, Baltimore, plans addition for bottling, storage and distribution. Cost close to $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 29 for one 5-kw. motor-generator set (Schedule 560), rough machined or completely machined steel forgings (Schedule 551-R), 19,320 lb. nickel alloy steel (Schedule 547) for Washington Navy Yard; 40 chain trolley hoists and 18 trolley suspensions (Schedule 570-R), six motor-driven combination wet and dry grinders and spare parts (Schedule 546) for Boston, Brooklyn, Philadelphia and Puget Sound yards.

OHIO AND INDIANA

City Council, East Liverpool, Ohio, has surveys and estimates of cost for new municipal electric light and power plant, totaling over $1,000,000 with equipment. Early action is planned. Shover & Loftus, Oliver Building, Pittsburgh. are consulting engineers.

Crystal Springs Brewing Co., Cleveland, recently organized, care of F. J. Hronek, 3763 East 126th Street, architect, plans early call for bids for new plant on Harvard Avenue. Cost over $150,000 with equipment.

Automatic Gear Corpn., Cleveland, care of Day & Day, Standard Bank Building, representatives, has been organized by John M. Connors, Cleveland, and associates, to manufacture gears and kindred mechanical products.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Aug. 29 for 90,000 ft. aircraft lighting and power cable (Circular 30); until Sept. 5, 150 fuel system unit assemblies, 2300 fuel line strainer screen assemblies, 2000 fuel tank outlet screen assemblies, etc. (Circular 39), 55,000 ft. high-tension ignition cable (Circular 42), 1500 connector panel assemblies, 700 utility switch assemblies, dash sockets, etc. (Circular 43).

Lion Brewery, Inc., Cincinnati, recently organized by H. T. Witherby and W. S. Schwartz, Cincinnati and associates, has taken over former Windisch-Muhlhauser brewery, Central Parkway and Wade Street, and will remodel for new plant to include new brew-house, bottling and other machinery. Cost over $200,000. E. A. Broberg, 2014 West Fifty-third Street, Cleveland, is architect.

Norton Brewing Co., Anderson, Ind., M. C. Norton, head, will soon take bids for extensions and improvements, including new bottling and other equipment. Cost over $90,000 with machinery. Richard Griesser, 64 West Randolph Street, Chicago, is architect.

Eli Lilly & Co., 730 South Alabama Street, Indianapolis, manufacturer of chemicals, drugs, etc., let general contract to Leslie Colvin, Continental Bank Building, for three-story and basement addition, 50 x 220 ft. Cost over $100,000 with equipment. Robert F. Daggett, Continental Bank Building, is architect.

Kiley Brewing Co., Inc., Marion, Ind., has arranged for sale of stock totaling $330,000, part of fund to be used for extensions and improvements in former brewery of Indiana Brewing Association on 9½-acre tract, to include brew-house, bottling and other equipment. Company was organized in July with capital of $750,000.

Cincinnati Metallizing Co., Cincinnati, recently organized by C. E. Hogan and N. C. Cosary, has established a plant at 205 Elm Street, specializing in metal spraying and coating. Company handles a complete line of metallizing equipment.

PACIFIC COAST

Board of City Trustees, Compton, Cal., James H. Park, city manager, plans erection of a municipal electric light and power plant to cost about $250,000 with equipment. Financing is being arranged.

Mojave Smelting Co., Reno, Nev., plans new smelting plant at mining properties at Mojave, Cal., including furnaces, power house, machine shop and other units. Cost over $200,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 29 for 50,000 lb. steel welding electrodes (Schedule 529), spare parts for storage batteries (Schedule 511) for Mare Island Navy Yard; bronze steam and water valves, and composition metal steam and water valves (Schedule 518) for San Diego yard.

Water and Steam Power Commission, Los Angeles, is arranging fund of $600,000 for additions and improvements in machine and mechanical shops, automobile and motor truck service and garage buildings, equipment storage and distributing buildings, and offices for Mono Basin and Owens Valley municipal construction projects, including new tools and equipment. Department of Water and Power, 207 South Broadway, will be in charge.

National Brewing Co., Inc., Rainier Avenue, Seattle, M. D. Kenney, vice-president, has approved plans for extensions and improvements, including equipment. Cost about $85,000 with machinery. Fred B. Stephen, Smith Tower Building, is architect.

Krause & Banks Shipyards Co., North Bend, Ore., plans rebuilding part of shipbuilding and repair plant recently destroyed by fire. Loss about $50,000 with equipment.

Cement Wrapped Pipe Co., Ltd., and Wailes-Dove-Hermiston Corpn., Textile Tower Building, Seattle, is considering additions to recently established plant for manufacture of large pipe units, to include new division for manufacture of enamel-lined cast iron and steel pipe.

North Whittier Heights Citrus Association, Hillgrove, Calif., has plans for new precooling plant and for new storage and distribution plant unit. Cost about $40,000 with equipment. Herbert A. Hamm, 579 North Holliston Avenue, Pasadena, Calif., is engineer.

Western Condensing Co., Eureka, Calif., Ellis Hart, vice-president, let general contract to Roy Kruger, Gustine, Calif., for new one-story steel and iron by-products plant at last-noted place. Cost about $30,000 with equipment.

FOREIGN

Sabinas Brewery, Ltd., Sabinas, Coahuila, Mexico, plans new branch works at San Antonio, Tex., where site has been secured, including power house, machine shop, pumping plant and other structures. Cost about $250,000 with machinery. Karl Haegelin is head.

Brazilian Railways, Rio de Janeiro, Brazil, have let contract to Metropolitan-Vickers Electrical Co., Ltd., London, England, for electrification of line from Rio de Janeiro to Sao Paulo, about 103 miles, at cost of £3,000,000 (about $13,470,000).

Imperial Chemical Industries, Ltd., London, England, has plans for expansion at alkali works at Norwich, England, including new buildings and installation of equipment. Project will cost over $600,000.

Krangede Co., Ltd., Stockholm, Sweden, plans steel tower transmission line from hydroelectric power plant at Krangede Falls, North Ragunda district, to points in central part of country, about 200 miles. Cost about 9,100,000 kroner ($1,100,000).

TRADE NOTES

Yale and Towne Manufacturing Co. with executive offices in the Chrysler Building, New York, announce the purchase of the real estate, machinery, tools, inventory, patents and goodwill of the Walker Vehicle Co. and the Automatic Transportation Co. of Chicago, makers of industrial electric trucks and commercial electric street vehicles. These new lines supplement the extensive lines already manufactured by the company. It will continue the manufacture and sale of the complete line of each company at 101 West 87th St., Chicago, retaining the present personnel with F. H. Tinsley in direct charge.

Mine & Smelter Equipment Co., Phoenix, Ariz., representing the shovel and crane division of Link-Belt Co. for a number of years, have moved to larger quarters, at 110-116 South Third Avenue.

Mine & Smelter Equipment Co. claim to have been the first concern in Arizona to specialize in machinery, and they have covered the construction and mining field for many years.

Allsteel Press Co., 12015 South Peoria Street, Chicago, has sold a 200 ton capacity straight sided, double crank, geared press of welded steel plate construction for export to Holland.

Jay G. Stephens Corpn., scrap dealer, Pittsburgh, has removed its offices to 2401 Koppers Building.

Struthers-Wells Co., chemical process equipment, Warren, Pa., has appointed Kerr Machinery Corpn., Kerr Building, Detroit, its representative in Michigan, exclusive of the northern peninsula, and National Equipment Co., Salt Lake City, Utah, representative in Utah, Idaho, Nevada, Montana and Wyoming west of Rock Springs.

Barde Sales Co., 2709 Utah Avenue, Seattle, Wash., is being organized by L. B. Barde, vice-president of the Barde Steel Co., operating steel jobbing warehouses in Seattle and Tacoma, Wash., and Portland, Ore. The purpose of the new company is to represent steel mills wishing distribution of their products in the Pacific Northwest. Arrangements have been perfected with the Barde Steel Co. whereby the sales force of that company will cooperate with the Barde Sales Co. in distributing the products of mills for direct mill shipments, both carload and less than carload.

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., has appointed Thomas M. Rees, 18 Fancourt Street, Pittsburgh, representative in the Pittsburgh district for its line of grinding machinery.

H. A. Brassert & Co., Chicago, have recently received an order for Askania automatic combustion control equipment from the Rust Furnace Co., Pittsburgh, for the Cambria works of the Bethlehem Steel Co., and an order for Askania draft control equipment from the Inland Steel Co., South Chicago, for its open-hearth furnace.

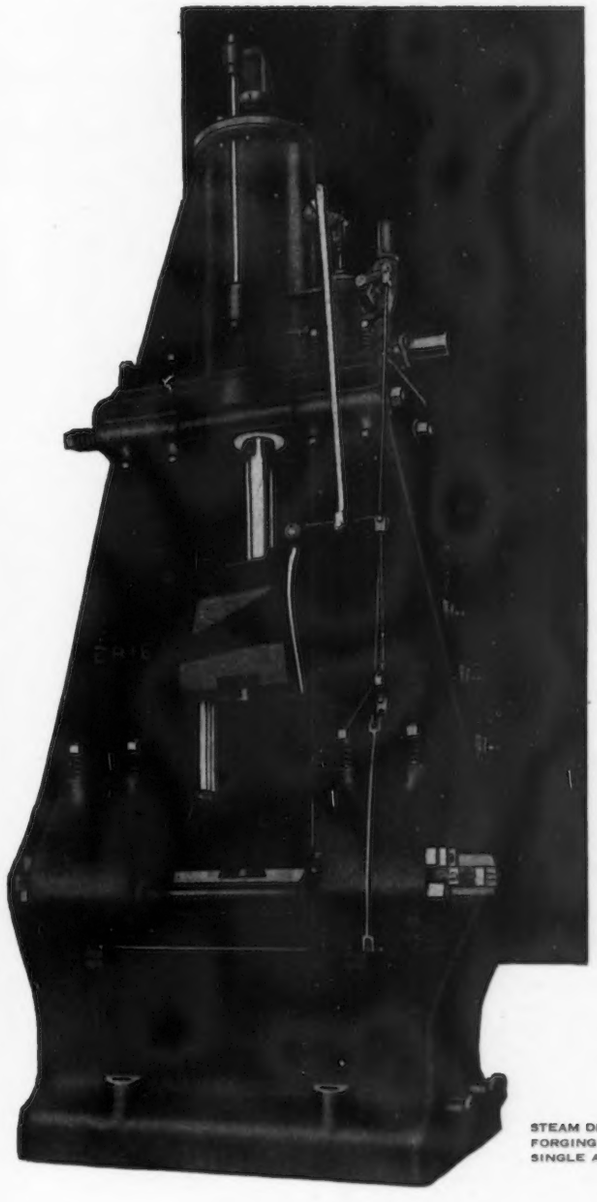
Whiting Corpn., cranes, foundry equipment and railway specialties, Harvey, Ill., has appointed C. F. Cate, 610 North Twelfth Street, Albuquerque, N. M., its representative in New Mexico.

Resnik-Katz, Inc., Syracuse, N. Y., has been organized for the purpose of handling, dismantling and disposing of railroads and street railway lines. Officers are: President, Solomon Katz; treasurer, Simon Katz, both of Solomon Katz Co., Inc., Syracuse; vice-president, Morris Katz; treasurer, Louis H. Resnik, both of American Steel & Iron Co., Boston.

H. A. Brassert & Co., Chicago, for E. I. duPont deNemours & Co., will install an automatic strainer at Gibbstown, N. J.

Steel Flooring.—Belmont Iron Works, Philadelphia. Catalog describing and illustrating the company's interlocking channel floors for highway and railroad bridge decks, roadways and plant buildings. Standard specifications and loadings are included.

Can Your Forging Equipment STAND the New Deal?



When the Recovery Act hits its stride with minimum wage rates and shorter hours — the added cost of production may be too much for a forge shop already handicapped by the high cost of operating old forging machinery.

We have been busy of late installing machines of the improved type in many forge shops. The savings which such shops can show because of modernization will be a stiff hurdle for poorly equipped shops no matter how generously the Recovery Act may operate.

This steam hammer is only one of the Erie line of forging machines that has been vastly improved to meet the needs of the hour. Let us assist you to the goal of profitable forging production.

STEAM DROP HAMMERS—BOARD DROP HAMMERS
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CHICAGO: 549 WASHINGTON BLVD.
INDIANAPOLIS: 335 POSTAL STATION BUILDING
PARIS, FRANCE: 8 RUE DE ROCROY

ERIE

JUST BETWEEN US TWO

WE are in a tough spot. We just made the mistake of voicing our not-too-enthusiastic opinion of some of the things that have been printed here.

The regular dispenser of these weekly confidences was preparing to go vacationing and settled the argument very adroitly by throwing "well, *you* do it" over his shoulder as he dashed for the elevator.

Caught thus unawares we were stumped for interesting family secrets to impart. We scratched our head, caught an idea, and discarded it, for we are determined not to mention codes. So we oiled the typewriter and meditated further. Then we strolled over to the cooler for a drink and upon returning discovered several pencils needing attention. It's really too hot to think. Finally we dived into the morning mail for inspiration.

We found:

Much correspondence about routine matters.
Two dozen new subscriptions.
Three new advertising contracts.
Much direct mail matter mostly in the form of letters.

Not much to talk about there except that these new subscriptions bring the total for the week up to a new three-year record. That might mean something.

* * *

WE even read the form letters. Mighty interesting, too—and well done, most of them. The thing that struck us though was that every one had that direct mail characteristic of working up to a definite bid for action of some sort. We found ourselves hardly able to resist the urge to sign up for a lot of things—send for samples of this and that—check the card for further details. If more advertisements were like that, or if advertisements were more like that, we thought, perhaps we wouldn't hear so much about the superiority of mail campaigns for producing inquiries. That is if inquiries mean anything.

Companies using both forms of promotion sometimes take pleasure in telling advertising salesmen that their direct mail "produces" better. Probably their letters have the action appeal we have been talking about and possibly their advertisements leave the reader cold—or only tepid. You know—a picture (maybe), a name and address (certainly), something about what the product will do (perhaps)—one of those advertisements that really says "here is our product, take it or leave it."

* * *

WITH a great fanfare and much to do a contemporary publication recently announced a new regular editorial feature of great importance to its readers. Just between us two, The Iron Age has for years and years given *its* readers the same news and comment to be found in this "new" feature. Only we never said much about it.

That sort of thing happens every once in a while. Some service that The Iron Age has provided right along in a modest way is presented elsewhere in a new and spectacular way and the other publication seeks credit for originality and initiative.

QUESTION: Is it better to spend all of our time securing and printing as much real information as possible, so every one will find what he wants between the covers, or should we print less and spend more time calling people's attention to what we do do?

* * *

EXTRA EXTRA

ADVERTISING STAFF DEMORALIZED

After several years' experience our advertising staff was just beginning to feel really capable of convincingly and capably answering the question: "Why should we advertise?, there is no business to be had." Now a bombshell has burst in the ranks. Yesterday a prospect said, "We're busy now, why advertise?"

The staff is utterly disarmed, totally unprepared for that sudden flank attack.

"Well," gasped the first one to regain his breath, "I guess that means the depression really is over."

ANON.

NTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY SEP 1 1933

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THE IRON AGE

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